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Vol. XXII, No. 4 APRIL, 1933

JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

TRADE MARK

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Published Monthly by the American Pharmaceutical Association: Office of publication, 20th & Northampton Sts., Easton, Pa. Editorial Office, 10 West Chase St., Baltimore, Md. Annual Subscription, $4.00; Canada, $4.35; Other Foreign, $4.50; Single Numbers, 35 cents; Canada, 40 cents; Other Foreign, 50 cents.

THE 81st ANNUAL MEETING OF THE AMERICAN PHARMACEUTICAL ASSOCIATION WILL BE HELD IN MADISON, WISCONSIN, AUGUST 28 TO SEPTEMBER 2, 1933, HOTEL LORAINE, HEADQUARTERS, EMERSON STANLEY, 602 CENTRAL BUILDING, MADISON, LOCAL SECRETARY.

The 1933 Meetings of the American Association of Colleges of Pharmacy, the National Association of Boards of Pharmacy, Conference of Pharmaceutical Association Secretaries, of the Pharmaceutical Law Enforcement Officials and the Plant Science Seminar will also be held in Madison.

Entered as second-class Matter, January 23, 1917, at the Post Office at Easton, Pa., under the Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in section 1103. Act of October 3, 1917; authorized July 10, 1918.

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Courtesy of Hugo Kantrowitz

Hager's Pharmacy, 1842. Hager was an outstanding German Pharmacist and memorialized by his "Handbuch."

Home of Joseph Priestley and grave at Northumberland, Pa. Joseph Priestley died at Northumberland, February 6, 1804.

EMERSON D. STANLEY.

JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

VOL. XXII APRIL, 1933 No. 4

THE LOCAL SECRETARY OF THE EIGHTY-FIRST ANNUAL MEETING OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.*

Emerson D. Stanley, Local Secretary of the AMERICAN PHARMACEUTICAL ASSOCIATION, for its 81st meeting to be held at Madison, Wis., was born in Milan, Mich., October 1, 1905. His father, James T. Stanley, owned and conducted the Stanley Book Store in Ypsilanti, Mich., where the young man received his earlier education and was graduated from the Ypsilanti High School.

While attending the Course in Pharmacy of the University of Wisconsin, 1925–1928, Mr. Stanley was employed by Keefrey's drug store, which enabled him to carry on his studies and gain drug store experience. He passed the Board of Pharmacy examination as "Assistant" in 1927 and during the following year he was registered as "Pharmacist."

After graduation Mr. Stanley negotiated the purchase of First Central Dispensary, a prescription-pharmacy situated on the sixth floor of the First Central Building in Madison. This pharmacy he has successfully and actively conducted since June 1928. He holds membership in the AMERICAN PHARMACEUTICAL ASSOCIATION and Wisconsin Pharmaceutical Association.

Mr. and Mrs. Stanley are the parents of a daughter and a son. The Local Secretary was chosen by the state and local pharmaceutical organizations to direct the arrangements of the 81st annual meeting of the AMERICAN PHARMACEUTICAL ASSOCIATION; the previous Wisconsin meeting was held in Milwaukee in 1884.

* Madison will also be the convention city for the National Association of Boards of Pharmacy, the American Association of Colleges of Pharmacy, the Conference of Pharmaceutical Association Secretaries, the Conference of Pharmaceutical Law Enforcement Officials and the Plant Science Seminar.

EDITORIAL

E. G. EBERLE, EDITOR 10 West Chase Street, BALTIMORE, MD.

YOUR PART IN THE CHICAGO WORLD'S FAIR.

CHAIRMAN H. C. Christensen reports that workmen are busy at the Hall of Science Building with the fixtures for the Pharmacy Exhibit. Five subcommittees are now engaged in the preparation of material which will be in place by May 15th. The exhibits will show the progress of Pharmacy—its history from earliest periods to its place in modern developments, the educational phases, its direction by legislation, research and manufacturing, and the perfection of the standards through the revisions of the United States Pharmacopœia, the National Formulary and the Pharmaceutical Syllabus.

These exhibits will acquaint the public with pharmacy as a public health profession, its legal regulations, advances in pharmaceutical education and training, the methods of directing its practice and its schools; the importance for safeguarding and controlling the distribution of poisons, narcotics and establishing the quality of drugs and medicines. The history will show the importance of pharmacy in developing commerce by the search for drugs and minerals and creating industries, and the public will become better acquainted with its part in related activities and with those who gave to the world invaluable information while serving the sick and afflicted. Jointly, with other professions, the sciences and arts, the exhibit will picture influential factors of general progress, even to the extent of visualizing how far-reaching in its influence is prescription practice.

A very desirable location for the Pharmacy Exhibit has been secured, representative of the close relation which exists in practice, with medicine, dentistry, surgery, hygiene, chemistry, manufacturing and outstanding in public health service. The value to be derived is great and so is the responsibility of pharmacists in assuring an exhibit of which we may be very proud and whereby the public will derive benefit and a better understanding of pharmacy.

Chairman Christensen asks members to do their part in financing this important venture; acknowledgments of contributions will be made, large or small, and these should at once be mailed to Treasurer Julius H. Riemenschneider, 2916 Broadway, Chicago, Ill. The degree of success depends on you and every one who has a part in pharmacy and the drug industry; may we ask for prompt action in this most important undertaking, now in the process of completion by and with your help.

RESPONSIBILITIES OF AUTHORSHIP.

BOOKS, newspaper and magazine articles are, at times, fruitful sources of misinformation whereby pharmacy suffers as a result of these literary efforts of exaggeration and vituperation. Contributions of this type are frequently written with a purpose of telling the story sensationally in order to attract readers and not for presentation of facts. They may be classed with persuasive advertisements that employ facts to instil fear and, having gained that point, deceitfully present

the remarkable qualities (?) of what they have for sale. Neither custom, nor policy, nor expedience can make wrong right, nor is it right to cause some one to believe that which is untrue. One need not go back very far to uncover publicity which compelled correction by the public and there is literary (?) publicity to-day which goes far beyond fairness and truth in order to produce gain and notoriety.

Certain of the books of the type referred to might serve a useful purpose, but in the eagerness to assure a reading of their books, authors do more harm than good. Selected portions of investigations are employed in developing their stories, or methods which are not applicable are employed to prove their claims. To question or criticize or ask for display of fairness would, probably, result in further charges and questioning of the purpose in taking exceptions—so the effort of correcting the unjust statements must largely remain with the individual, however unpleasant this may be. Fortunately, readers understand the purpose of writings of this kind and, eventually, thereby will come reform and truth in literature that seeks to destroy, or has the acquirement of gain as a major purpose, just as this is evident in some forms of questionable advertising. Some of the articles are comparable to the exploitation of worthless stocks. We believe that some of the authors of certain writings, the fairness of which has been questioned, know that they have gone far beyond justice and right in their effusions.

FOOD AND DRUGS ACT REVISION UNDER CONSIDERATION.

W. G. CAMPBELL, Chief of the Food and Drug Administration, discussed food and drug control, on April 4th, at the Philadelphia College of Pharmacy and Science, and since then, and probably earlier, steps have been taken to revise the Food and Drugs Act. On April 10th, the Executive Committee of the National Drug Trade Conference met in Washington and discussed phases of the revision which had been made public by the press and otherwise. The general features of the proposed bill have been discussed with President Roosevelt by Secretary Wallace, Assistant Secretary Tugwell and Mr. Campbell. The latter believes there is necessity for certain control of advertising, of labeling, that manufacturers should be licensed under certain conditions, that supervision should apply to foods and that, in emergency, there should be authority to employ additional tests to insure that the official standards are observed. It is stated that opportunity will be given to divisions of the affected industries to discuss the revision before the bill goes to Congress for action.

Details of the proposal have not been made public, but the provisions being considered for inclusion are stated in the foregoing; stricter penalties are being considered. The experience with adulterated Jamaica ginger is referred to as an example for the need of tests not provided in the U. S. P. and N. F.

Under the direction of Rexford G. Tugwell, Assistant Secretary of Agriculture, representatives of the Food and Drug Administration and the office of the Solicitor of the Department of Agriculture have been working for some time in preparing a draft of the proposed legislation. Proposals to amend the present act have been discarded as too cumbersome, and the plan therefore is to rewrite the law completely.

The Assistant Secretary of Agriculture is a former professor of economics; he has been interested in such organizations as Consumers Research, Inc., and the People's Lobby; he has written a number of books and articles expounding progressive ideas, and is a strict regulationist in his political theory. The attitude of the Secretary of Agriculture, Henry A. Wallace, and of President Roosevelt, toward strengthening the Food and Drugs Act is known only by the fact that the Secretary has permitted the work to progress to its present stage. It has been stated that the revised law will cover cosmetics, and various other provisions have been mentioned. The National Drug Trade Conference is observing the progress of the revision, as far as this is possible, with a purpose of representing the drug industry and mindful of the interests of the people.

PLAN TO REUNITE BUREAUS.

THE newly appointed director of Prohibition in the Department of Justice is developing a plan to reunite the bureaus of prohibition, narcotics and industrial alcohol. He announced his belief that greater efficiency and greater economy could be achieved by a merger of the three groups and that he would make an intensive study of the proposal with the view of presenting recommendations for his plans in the near future.

Director A. V. Dalrymple served in the prohibition unit of the Bureau of Internal Revenue a number of years ago and his plan is said to be based on that of the Wilson administration under which there was a centralization of the statutes relating to prohibition, narcotics and permissive use of alcohol.

There is opposition to the plan, because it is believed by a number of those affected, that no economy would result and they base their conclusions as to efficiency on former experience. This seems to be a day of changing the order of things—it evidences activity, but effectiveness and improvement are just as essential.

NARCOTIC CONTROL AGREEMENT.

THE Narcotics Limitation Convention of 1931 has been ratified, or acceded to, by twenty-nine nations; the manufacturing nations included are France, Germany, Great Britain, Turkey and the United States. It is expected that in making effective the agreement a forward step has been taken in reducing the amount of narcotics nearer to the requirement for medical and scientific purposes, which corresponds closely to the provisions enforced in the United States for the past several years, but the difficulties in making this effort a more complete success has been due to illicit traffic, which will now in a large measure be corrected.

The convention plan provides a system whereby each country submits the amount of its requirements, and manufactures of the respective countries must not exceed the total quantity shown by the estimates. The treaty requires also control of the distribution of codeine and of substances synthetically prepared that are identical in chemical constitution with the corresponding derivatives of opium and of coca leaf; other provisions seek to control the distribution of related derivatives which may be discovered or developed.

A forward step has been taken by the adoption of this international agreement.

SCIENTIFIC SECTION

BOARD OF REVIEW ON PAPERS.—*Chairman*, L. W. Rowe; John C. Krantz, Jr.; F. J. Bacon.

THE EFFECT OF VARIOUS COMPOUNDS UPON THE STABILITY OF HYDRIODIC ACID.*[1]

BY WILLIAM J. HUSA[2] AND LOUIS MAGID.[3]

INTRODUCTION.

A study of the effect of various iodides upon the stability of hydriodic acid was carried out by Husa and Shattuck (1). The purpose of the present investigation was to make a further study of the effect of iodides and to determine the effect of various acids and salts upon the stability of hydriodic acid.

HISTORICAL REVIEW.

In 1877 G. Lemoine (2) reported that an aqueous solution of hydrogen iodide is not changed by the influence of light if air is absent, but that in presence of oxygen or air, slow decomposition takes place in the light as well as in the dark.

J. Pinnow (3), in 1901, found that the rate of oxidation of mixtures of sulphuric acid and potassium iodide increased proportionally with the concentration of the sulphuric acid in light, but not in darkness, provided the concentration of iodine did not exceed a Gm. per liter. The accelerating influence of light was most marked in dilute solutions. When sulphuric acid was replaced by hydrochloric acid, the reaction was twice as rapid, while phosphoric acid had only a slight accelerating influence on the rate of decomposition in light.

J. Plotnikoff (4) studied the oxidation of the hydriodic acid present in a mixture, charged with oxygen, of solutions of potassium iodide and hydrochloric acid. The oxidation proceeded at a measurable rate in darkness and was markedly accelerated by light of the spectral region around 4360 Angstrom units. It was concluded that the photochemical oxidation was proportional to the concentration of oxygen, to the two-thirds power of the concentration of potassium iodide and to the four-thirds power of the concentration of hydrochloric acid. The reaction in darkness was accelerated by a cupric salt or a mixture of ferric and cupric salts; manganese and lead salts exerted no appreciable catalytic action; the catalytic effect of nitrous acid was very marked even if the solution contained the equivalent of only 0.00000006 *N* nitrous acid. Additions of uranyl sulphite retarded the velocity of the reaction in light, as did starch, eosine and cupric sulphite; in the dark, the latter compound accelerated the reaction.

In 1908, Creighton and Mackenzie (5) found that under some conditions the decomposition of hydriodic acid was accelerated by the influence of radium but that at room temperature in absence of oxygen neither sunlight nor radium caused decomposition of dilute hydriodic acid solutions.

Kailan (6), in 1913, reported that slightly or strongly acid solutions of manganese, calcium, strontium and barium iodides are decomposed by X-rays. The decomposition increased with increased concentration. There was no connection between the molecular weight of the iodide and the rate of decomposition.

---

* Presented before the Scientific Section, A. PH. A., Toronto, Canada, 1932.

[1] This paper is based on a thesis presented to the Graduate Council of the University of Florida, by Louis Magid, in partial fulfilment of the requirements for the degree of Master of Science in Pharmacy.

[2] Head Professor of Pharmacy, University of Florida.

[3] Winner of the Fairchild Scholarship, 1931.

Husa and Shattuck (1) found that the rate of decomposition of hydriodic acid was increased by the following factors: exposure to air, exposure to light, increase in temperature and increase in concentration. The effect of various iodides in 0.5 *M* concentration upon the rate of decomposition of 0.1 *N* hydriodic acid in the dark was as follows: marked acceleration, Fe^{++} and Mn; appreciable acceleration, Na, Sr, NH_4; slight acceleration, Ca, K, Li; slight retardation, Mg, Cd, Zn; marked retardation, Ba. Only FeI_2 and MnI_2 had any effect on the rate of decomposition of 0.1 *N* HI when present in concentrations of 0.1 *M*, 0.01 *M* or 0.001 *M*; this effect was attributed to a specific catalytic effect of Fe^{++} and Mn^{+++} ions. The effect of iodides in general was explained on the basis of the increased concentration of HI molecules brought about by the common ion effect of the iodides. It was stated that on the basis of this hypothesis iodides which are only slightly ionized would have little effect and that the formation of double iodides such as $2\ HI{\cdot}CdI_2$ or H_2CdI_4 would tend to withdraw some HI molecules and by thus lowering their concentration would lower the rate of decomposition; the experimental results were consistent with this explanation.

EXPERIMENTAL DATA.

Preparation of Hydriodic Acid.—The hydriodic acid was prepared by the action of hydrogen sulphide upon iodine in aqueous solution, the product being purified by distillation under reduced pressure. The details were as described by Husa and Shattuck (1) with the exception that the sulphur was removed by filtration through a layer of glass wool covered by a layer of short-fibre, acid-washed asbestos, instead of through glass wool alone. The choice of a filtering medium was based on tests of five methods as follows: (*a*) using glass wool alone, (*b*) using glass wool and asbestos, (*c*) using glass wool and asbestos with suction, (*d*) using

TABLE I.—EFFECT OF VARIOUS *N*/2 IODIDES ON RATE OF DECOMPOSITION OF *N*/10 HI.

Percentage Decomposition after 3 Days.

	Black Bottles.		Colorless Bottles.	
	Control *N*/10 HI.	*N*/10 HI + *N*/2 iodide.	Control *N*/10 HI.	*N*/10 HI + *N*/2 iodide.
	Ferrous Iodide.			
Dark (refrigerator)	0.40	72.25	0.56	74.28
Dark (room temp.)	1.43	74.28	1.35	78.36
Diffused light	1.19	89.55	1.03	80.39
Sunlight	1.07	87.51	15.26	76.32
	Manganese Iodide.			
Dark (refrigerator)	0.24	3.24	0.24	2.79
Dark (room temp.)	1.43	6.29	1.43	6.29
Diffused light	1.59	6.29	1.59	7.24
Sunlight	1.19	9.23	15.36	57.31
	Strontium Iodide.			
Dark (refrigerator)	0.24	1.51	0.28	1.67
Dark (room temp.)	0.44	1.77	0.48	1.77
Diffused light	0.46	1.77	0.48	5.27
Sunlight	0.54	2.27	14.59	54.44
	Lithium Iodide.			
Dark (refrigerator)	0.40	0.80	0.48	0.88
Dark (room temp.)	1.43	3.66	1.47	6.65
Diffused light	1.35	3.82	1.35	6.73
Sunlight	1.83	4.46	14.76	65.13

TABLE I.—*Continued.*

Sodium Iodide.				
Dark (refrigerator)	0.45	0.89	0.46	0.87
Dark (room temp.)	0.85	2.63	0.94	2.99
Diffused light	0.85	2.63	1.00	6.45
Sunlight	2.85	7.37	15.12	61.47
Potassium Iodide.				
Dark (refrigerator)	0.09	0.16	0.09	0.16
Dark (room temp.)	0.48	1.39	0.50	1.48
Diffused light	0.50	1.35	0.55	4.81
Sunlight	0.62	1.87	16.67	59.65
Ammonium Iodide.				
Dark (refrigerator)	0.88	0.96	0.56	0.96
Dark (room temp.)	0.96	1.63	1.15	2.55
Diffused light	1.39	2.70	1.27	4.78
Sunlight	1.03	3.20	14.25	58.51
Calcium Iodide.				
Dark (refrigerator)	0.24	0.16	0.24	0.04
Dark (room temp.)	1.31	1.43	1.19	1.43
Diffused light	1.23	1.43	1.23	3.42
Sunlight	1.47	2.15	15.40	48.34
Magnesium Iodide.				
Dark (refrigerator)	0.32	0.48	0.40	0.72
Dark (room temp.)	0.96	1.83	1.00	1.83
Diffused light	1.00	1.71	1.03	2.47
Sunlight	1.03	1.99	10.98	22.61
Cadmium Iodide.				
Dark (refrigerator)	0.28	0.24	0.28	0.18
Dark (room temp.)	1.08	0.80	1.25	0.81
Diffused light	1.08	0.85	1.13	0.85
Sunlight	1.64	0.90	13.15	9.70
Zinc Iodide.				
Dark (refrigerator)	0.24	0.40	0.24	0.40
Dark (room temp.)	0.92	0.64	1.07	0 72
Diffused light	1.07	0.64	1.03	4.14
Sunlight	1.15	1.00	15.44	61.06
Mercuric Iodide.				
(Greater portion remained undissolved.)				
Dark (refrigerator)	0.24	0.04	0.24	0.04
Dark (room temp.)	0.72	0.24	0.72	0.28
Diffused light	0.72	0.20	0.76	0.20
Sunlight	0.92	0.51	14.25	8.65
Mercuric Iodide (Tenth-Normal.)				
Dark (refrigerator)	0.24	0.24	0.24	0.24
Dark (room temp.)	0.68	0.64	0.68	0.56
Diffused light	0.64	0.56	0.64	0.56
Sunlight	0.84	0.56	17.51	10.11
Barium Iodide.				
Dark (refrigerator)	0.07	0.00	0.09	0.00
Dark (room temp.)	0.38	0.00	0.48	0.00
Diffused light	0.36	0.00	0.40	0.00
Sunlight	0.84	0.00	17.51	54.37

an alundum filter with suction and (*e*) using a Gooch crucible and asbestos with suction. Method *b* was the only one which gave a perfectly clear, colorless filtrate. Methods *a*, *c* and *e* gave cloudy filtrates. The alundum filter had been used by Noyes and Freed (7) but under our conditions the filtration by this method was slow, and the filtrate was slightly colored due to decomposition, although it was very clear and free from particles.

Method of Conducting Experiments with Iodides.—The solutions were made by placing 50 cc. of $N/5$ HI in a 100-cc. volumetric flask and adding a weight of the iodide sufficient to make 100 cc. of a $N/2$ solution; water was then added up to the 100-cc. mark, making the solution $N/2$ with respect to the iodide and $N/10$ in respect to HI. Exactly 10-cc. portions of each solution were placed in black bottles and in colorless pyrex bottles of 125 cc. capacity and the bottles were placed under the following conditions: (*a*) dark (refrigerator), (*b*) dark (room temperature), (*c*) diffused light, (*d*) sunlight (on the roof). Controls of $N/10$ HI were placed in similar bottles under the same conditions at the same time. After three days, the amount of free iodine in the various solutions was determined by titration with 0.002 N $Na_2S_2O_3$ V. S. In the tables the amount of free iodine is expressed as percentage decomposition of the HI used.

The results in Table I indicate that the effect of various iodides was as follows: marked acceleration, Fe^{++}, Mn, Sr; appreciable acceleration, Li, Na, K; slight acceleration, NH_4, Mg, Ca (under all conditions except in the refrigerator in the dark, where there was retardation); slight retardation, Cd, Hg^{++} ($N/10$), Zn (under all conditions except in the refrigerator in the dark and in colorless bottles in light, where there was acceleration); marked retardation, Hg^{++}, Ba (except in sunlight in colorless bottles, where there was acceleration).

Experiments with Acids.—The solutions were prepared by mixing equal portions of solutions of hydriodic acid and of the acid specified, both solutions being double the normality desired in the final mixture. The tests were conducted as in the case of the iodides.

As shown in Table II, the effect of acids on the rate of decomposition of $N/10$ HI was as follows: $N/1000$ HCl, slight acceleration except in sunlight in colorless bottles, where there was practically no effect; $N/100$ HCl, slight acceleration; $N/10$ HCl, slight acceleration; $N/2$ HCl, marked acceleration; $N/1000$ H_2SO_4, practically no effect except in sunlight in colorless bottles, where there was a slight acceleration; $N/100$ H_2SO_4, very slight acceleration; $N/10$ H_2SO_4, slight acceleration; $N/2$ H_2SO_4, appreciable acceleration.

Experiments with Salts.—In the experiments with various chlorides and sulphates, the solutions were prepared in the same manner as the solutions of iodides described above. The salts which showed an appreciable effect in $N/2$ concentration were tested further in concentrations of $N/10$, $N/100$ and $N/1000$.

As indicated in Table III, sodium chloride had practically no effect except in sunlight in colorless bottles, where there was a very slight retardation.

The results in Table IV show that the effect of various salts was as follows: marked acceleration, increasing with concentration, $NiCl_2$, $FeCl_2$, $CoSO_4$; practically no effect, NH_4Cl, NaCl, LiCl; very slight retardation, $MnSO_4$, $MgCl_2$, $SrCl_2$, $BaCl_2$, $ZnCl_2$, $CaCl_2$, KCl; marked retardation, increasing with concentration, $Al_2(SO_4)_3$, $CdCl_2$.

TABLE II.—EFFECT OF VARIOUS ACIDS ON THE RATE OF DECOMPOSITION OF *N*/10 HI.

Percentage Decomposition after 3 Days.

	Black Bottles.		Colorless Bottles.	
	Control *N*/10 HI.	*N*/10 HI + other acid.	Control *N*/10 HI.	*N*/10 HI + other acid.
	N/1000 Hydrochloric Acid.			
Diffused light	0.39	0.46	0.40	0.50
Sunlight	0.50	0.65	17.19	17.06
	N/100 Hydrochloric Acid.			
Diffused light	0.42	0.51	0.44	0.51
Sunlight	0.59	0.65	17.97	19.02
	N/10 Hydrochloric Acid.			
Diffused light	0.47	0.91	0.50	1.13
Sunlight	0.55	1.08	16.15	23.97
	N/2 Hydrochloric Acid.			
Diffused light	0.47	2.85	0.50	2.87
Sunlight	0.55	3.54	16.15	37.51
	N/1000 Sulphuric Acid.			
Diffused light	0.58	0.57	0.62	0.59
Sunlight	0.44	0.44	14.59	17.19
	N/100 Sulphuric Acid.			
Diffused light	0.58	0.69	0.62	0.69
Sunlight	0.44	0.46	14.59	18.19
	N/10 Sulphuric Acid.			
Diffused light	0.58	0.85	0.62	0.85
Sunlight	0.44	0.51	14.59	22.14
	N/2 Sulphuric Acid.			
Diffused light	0.58	1.73	0.62	1.77
Sunlight	0.44	1.04	14.59	31.26

TABLE III.—EFFECT OF SODIUM CHLORIDE ON THE RATE OF DECOMPOSITION OF *N*/10 HI.

Percentage Decomposition after 3 Days.

	Black Bottles.		Colorless Bottles.	
	Control *N*/10 HI.	*N*/10 HI + NaCl.	Control *N*/10 HI.	*N*/10 HI + NaCl.
	N/1000 Sodium Chloride.			
Diffused light	0.52	0.52	0.50	0.50
Sunlight	0.46	0.44	11.07	10.94
	N/100 Sodium Chloride.			
Diffused light	0.52	0.51	0.50	0.50
Sunlight	0.46	0.46	11.07	10.42
	N/10 Sodium Chloride.			
Diffused light	0.33	0.32	0.35	0.36
Sunlight	0.34	0.30	18.54	16.62
	N/2 Sodium Chloride.			
Diffused light	0.33	0.37	0.35	0.39
Sunlight	0.34	0.22	18.54	15.89

TABLE IV.—PERCENTAGE DECOMPOSITION OF $N/10$ HYDRIODIC ACID ALONE AND IN PRESENCE OF VARIOUS SALTS IN BLACK BOTTLES IN THERMOSTAT AT 30° C.

Percentage Decomposition after 3 Days of $N/10$ HI in Presence of Salts in Following Concentrations.	Expt. 1.	Expt. 2.	Expt. 3.	Expt. 4.	Expt. 5.
Salt present	$N/2$.	$N/2$.	$N/10$.	$N/100$.	$N/1000$.
Acid alone	0.69	0.79	0.79	0.79	0.79
$Al_2(SO_4)_3$	0.29	....	0.62	0.76	0.79
$FeCl_2$	7.40	....	2.04	1.37	0.86
$CoSO_4$	1.98	....	1.54	1.06	0.79
$NiCl_2$	....	2.05	1.08	0.81	0.81
$CdCl_2$	....	0.07	0.18	0.69	0.79
$MnSO_4$	....	0.72	....	....	....
$MgCl_2$	....	0.65	....	....	....
NH_4Cl	....	0.79	....	....	....
$SrCl_2$	....	0.71	....	....	....
$BaCl_2$	....	0.72	....	....	....
LiCl	....	0.80	....	....	....
$ZnCl_2$	0.62	....	....	....	....
$CaCl_2$	0.65	....	....	....	....
KCl	0.58	....	....	....	....
NaCl	0.65	....	....	....	....

Effect of Change of p_H on Solutions of Uniform Iodide Concentration.—Solutions containing NaI and HI in various proportions were tested for stability and the p_H was determined colorimetrically.

TABLE V.—THE EFFECT OF CHANGE OF p_H ON SOLUTIONS OF UNIFORM IODIDE CONCENTRATION.

Normality of Solution NaI.	Normality of Solution HI.	Percentage Decomposition after 3 Days in Black Bottles at 30° C.	p_H.
0.20	0.00	0.00	6.7
0.18	0.02	0.15	1.7
0.15	0.05	0.39	1.3
0.12	0.08	0.64	1.1
0.10	0.10	0.75	1.05
0.08	0.12	0.92	0.9
0.05	0.15	1.33	0.85
0.02	0.18	1.53	0.80
0.00	0.20	1.85	0.75

Table V indicates that with constant concentration of the iodide radical, the rate of decomposition increases with decrease of p_H.

Determinations of p_H of Iodide and Other Salt and Acid Solutions Alone and in Presence of $N/10$ HI.—The determinations of p_H were made colorimetrically.

DISCUSSION OF RESULTS.

Husa and Shattuck (1) explained their results on the basis of the hypothesis that the rate of decomposition is proportional to the concentration of HI molecules. However, the results may also be explained on the basis that the iodide ions are oxidized and that the decomposition is proportional to the concentration of the iodide ions. Thus, instead of representing the oxidation as:

$$(A) \quad 4\,HI + O_2 = 2\,H_2O + 2\,I_2,$$

it may be represented ionically as follows:

$$(B)\quad 4\,I^{-} + O_2 + 4\,H^{+} = 2\,H_2O + 2\,I_2.$$

TABLE VI.

	p_H of Solution Alone.	p_H of Solution + $N/10$ HI.		p_H of Solution Alone.	p_H of Solution + $N/10$ HI.
$N/10$ HI	1.1	...	$N/2$ H_2SO_4	0.6–0.7	0.6
$N/2$ ZnI_2	3.3	1.1	$N/1000$ NaCl	5.6	1.1
$N/2$ NH_4I	5.5	1.0	$N/100$ NaCl	5.6	1.1
$N/2$ CdI_2	6.2	0.7	$N/10$ NaCl	5.6	1.1
$N/2$ MnI_2	6.3	0.9	$N/2$ NaCl	5.6	1.1
$N/2$ KI	6.5	0.7	$N/1000$ $Al_2(SO_4)_3$	4.3	1.1
$N/2$ NaI	6.8	1.1	$N/100$ $Al_2(SO_4)_3$	4.1	1.3
$N/2$ LiI	8.7	1.0	$N/10$ $Al_2(SO_4)_3$	3.7	1.5
$N/2$ BaI_2	8.7	1.1	$N/2$ $Al_2(SO_4)_3$	...	1.7
$N/2$ MgI_2	8.8	0.9	$N/1000$ $FeCl_2$	...	1.1
$N/2$ CaI_2	10.8	0.7	$N/100$ $FeCl_2$	...	1.1
$N/2$ SrI_2	10.8	1.0	$N/10$ $FeCl_2$	...	1.1
$N/10$ HgI_2	...	0.7	$N/2$ $FeCl_2$	...	1.1
$N/1000$ HCl	3.0	1.1	$N/1000$ $CdCl_2$	5.5	1.1
$N/100$ HCl	2.0	0.9	$N/100$ $CdCl_2$	5.2	1.1
$N/10$ HCl	1.1	0.7	$N/10$ $CdCl_2$	4.9	1.1
$N/2$ HCl	0.4	0.3	$N/2$ $CdCl_2$	4.9	1.3
$N/1000$ H_2SO_4	3.1	1.1	$N/1000$ $NiCl_2$	5.5	1.1
$N/100$ H_2SO_4	2.1	1.1	$N/100$ $NiCl_2$	5.5	1.1
$N/10$ H_2SO_4	1.2	0.9	$N/10$ $NiCl_2$	5.3	1.1
$N/2$ $NiCl_2$	4.1	1.1	$N/2$ $SrCl_2$	5.1	1.1
$N/1000$ $CoSO_4$	4.3	1.1	$N/2$ $BaCl_2$	5.5	1.3
$N/100$ $CoSO_4$	3.5	1.1	$N/2$ LiCl	4.9	1.3
$N/10$ $CoSO_4$	3.0	1.3	$N/2$ $ZnCl_2$	...	1.1
$N/2$ $CoSO_4$	2.1	1.3	$N/2$ $CaCl_2$	5.9	1.1
$N/2$ $MnSO_4$	4.9	1.5	$N/2$ KCl	5.5	1.1
$N/2$ $MgCl_2$	5.9	1.1	$N/2$ NaCl	5.5	1.1
$N/2$ NH_4Cl	5.0	1.1	.....	..	...

On the basis of equation (B), each iodide ion loses an electron and is converted into free iodine, while each oxygen atom gains two electrons and unites with two hydrogen ions to form water. From this equation it would follow that the rate of decomposition is dependent on the concentration of iodide ions, hydrogen ions and oxygen. The discharging potential of iodidion is given by Walker (8) as -0.80 and that of oxidion as -1.49. These values indicate the reason for the readiness with which hydriodic acid decomposes in the presence of oxygen.

The results with sodium iodide (Tables I and VI) indicate that with constant p_H, an increase in iodide concentration causes an increase in the rate of decomposition. With constant iodide concentration, an increase in hydrogen-ion concentration increases the rate of decomposition (Table V). An increase in the concentration of hydriodic acid would increase the concentration of both hydrogen ions and iodide ions, as well as HI molecules, thus increasing the rate of decomposition, as was observed by Husa and Shattuck (1).

The decomposition of hydriodic acid that takes place in absence of oxygen is probably best represented as follows:

$$2\ HI = H_2 + I_2.$$

To summarize, the effect of various acids and salts on the rate of decomposition of hydriodic acid may be explained as follows: The effect of iodides that increase the rate of decomposition of hydriodic acid is due to the increased concentration of iodide ions and/or the increased concentration of HI molecules due to the common ion effect of the iodide ions in driving the following reaction to the left:

$$(C)\quad HI \rightleftharpoons \overset{+}{H} + \overset{-}{I}$$

Iodides that are only slightly ionized have practically no effect, as the concentration of iodide ions is not appreciably affected. The retarding influence of certain iodides, such as cadmium iodide, may be correlated with the tendency toward formation of complex ions, thus reducing the concentration of iodide ions and HI molecules:

$$2\ HI + CdI_2 \rightleftharpoons H_2CdI_4,$$

or represented ionically,

$$CdI_2 = 2\ \overset{-}{I} \rightleftharpoons \overset{=}{CdI_4}.$$

Hittorf (9) showed that complex formation in cadmium iodide solutions is considerable at higher concentrations, but decreases as the solution is made more dilute; in $N/100$ solution only simple ions appear to exist. It has been suggested by Noyes (10) that $BaCl_3^-$ and $BaCl_4^{--}$ ions probably exist in more concentrated solutions of barium chloride. Barium iodide also probably forms complex ions such as BaI_3^- and BaI_4^{--}. Mercuric, zinc and magnesium iodides likewise tend to form complex ions.

According to Glasstone (11), "since weak electrolytes probably have a definite heat of ionization in solution, an increase in temperature will cause a decrease in degree of ionization." It follows that a lowering of the temperature will increase the degree of ionization. Thus if a slightly ionized solution were placed in a refrigerator, the low temperature might cause a greater degree of ionization, and consequently a greater increase in rate of decomposition of hydriodic acid, unless at the lower temperature, there was a greater tendency toward formation of complex ions, which would decrease the rate of decomposition. The latter effect may explain why calcium iodide retards the decomposition in the refrigerator, but has a slight accelerating effect under the other conditions. On the other hand, zinc iodide has a slight retarding influence under all conditions except in the refrigerator and in colorless bottles in diffused light and sunlight, where the rate of decomposition is appreciably increased. Barium iodide has a marked retarding influence under all conditions except in colorless bottles in sunlight, where the rate of decomposition was appreciably increased. It thus seems that under the influence of light and higher temperatures, some of the iodides may have less tendency to form complex ions.

Iodides are frequently crystallized from slightly alkaline solutions to prevent decomposition; solutions of such iodides would show a higher p_H than the absolutely pure iodides. None of the iodides raised the p_H of $N/10$ HI, but some lowered it. The factors that might lower the p_H are: (*a*) hydrolysis of the iodide,

(*b*) the formation of double compounds, where the double compounds are appreciably ionized. H_2ZnI_4 is apparently a weaker acid than H_2CdI_4.

The increased rate of decomposition of $N/10$ HI on addition of strong acids may be explained on the basis of the common ion effect of the hydrogen ion in driving reaction (C) to the left, and on the increased concentration of hydrogen ions on the basis of equation (B). In the higher concentrations of acid used, the increased rate of decomposition may be due to both of these factors. When the concentration of HCl or H_2SO_4 is $N/1000$ or $N/100$, the effect of increased hydrogen-ion concentration on the basis of equation (B) is probably the predominating factor, since the change in concentration of HI molecules according to equation (C) would be slight at those concentrations. The rate of decomposition of hydriodic acid is more sensitive to hydrogen-ion concentration than to iodide-ion concentration, as shown by the comparative effect of low concentrations of iodides, as observed by Husa and Shattuck (1) and low concentrations of acids, as observed in this investigation. As the concentration of the acids increased, the rate of decomposition of hydriodic acid increased. Decomposition was more rapid in colorless bottles than in black bottles, and more rapid in sunlight than in diffused light. The rate of decomposition of hydriodic acid is increased more by hydrochloric acid than by sulphuric acid. This may be explained on the basis of the greater degree of ionization of hydrochloric acid, which consequently supplies more hydrogen ions.

Hahn and Clos (12) in the course of an investigation on iodometric titrations of iron, observed that strong acids increased the rate of oxidation of hydriodic acid by atomospheric oxygen. This observation is in accord with the results of the present investigation. However, in the work of Hahn and Clos, the rate of oxidation of hydriodic acid would also be markedly increased by the Fe^{++} ions present in their solutions.

On the basis of the hypothetical explanations given above, it would be expected that the addition of a salt having no ion in common with hydriodic acid would have practically no effect. Experiments with $N/1000$, $N/100$, $N/10$ and $N/2$ sodium chloride indicate that this salt has practically no effect except in sunlight in colorless bottles, where the rate of decomposition is very slightly retarded. To the extent that the rate of decomposition of hydriodic acid is due to HI molecules, a very slight retarding effect of NaCl might be expected. On the basis of the Arrhenius theory of electrolytic dissociation, in a mixture of HI and NaCl, certain equilibrium concentrations of HCl and NaI molecules would be reached, and as this process would withdraw some of the hydrogen and iodide ions, there would be a further electrolytic dissociation of HI, thus decreasing the concentration of HI molecules. However, on the basis of the theory that strong electrolytes are completely or almost completely dissociated in aqueous solution, the concentration of all molecular species of the salts would be negligible and under these conditions sodium chloride should have no effect.

The salts that have no ion in common with hydriodic acid, but have a marked tendency to increase the rate of decomposition of HI, may be regarded as having a cation which has a catalytic effect on the oxidation of HI. Ni^{++}, Fe^{++} and Co^{++} may be regarded as having a specific catalytic effect.

The fact that $MnSO_4$ shows no accelerating influence on the rate of decompo-

sition of hydriodic acid is not in agreement with the previously reported statement (1) that Mn^{++} has a specific catalytic effect. The accelerating effect of MnI_2 may have been due entirely to the effect of increased iodide concentration and hydriodic acid concentration due to hydrolysis of MnI_2.

The retarding influence shown by $Al_2(SO_4)_3$ is probably due to the formation of complex compounds in a manner similar to the formation of alums in concentrated solutions. It is to be noted that in $N/100$ solutions aluminum sulphate has practically no effect on the decomposition of hydriodic acid.

SUMMARY.

1. The effect of various iodides in $N/2$ concentration upon the rate of decomposition of $N/10$ hydriodic acid was as follows: marked acceleration, ferrous, manganese and strontium iodides; appreciable acceleration, sodium, potassium and lithium iodides; slight acceleration, magnesium, calcium and ammonium iodides; slight retardation, zinc and cadmium iodides; marked retardation, barium and mercuric iodides.

2. With constant p_H, an increase in iodide concentration increases the rate of decomposition of HI, and with constant iodide concentration an increase in hydrogen-ion concentration increases the rate of decomposition. The rate of decomposition is increased more by HCl than by H_2SO_4.

3. The effect of various salts on the rate of decomposition of hydriodic acid was as follows: marked acceleration, $NiCl_2$, $FeCl_2$ and $CoSO_4$; no effect, NH_4Cl, LiCl and NaCl; slight retardation, $MnSO_4$, $MgCl_2$, $SrCl_2$, $BaCl_2$, $ZnCl_2$, $CaCl_2$ and KCl; marked retardation, $Al_2(SO_4)_3$ and $CdCl_2$.

4. The salts that have no ion in common with hydriodic acid, but have a marked tendency to increase the rate of decomposition of hydriodic acid, may be regarded as having a cation which has a specific catalytic effect on the oxidation of hydriodic acid. Ni^{++}, Fe^{++} and Co^{++} may be regarded as having a specific catalytic effect.

5. The retarding influence of certain salts may be correlated with the known tendency toward formation of complex ions, thus reducing the concentration of iodide ions and HI molecules.

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A STUDY OF THE U. S. P. X METHOD AND A MODIFIED METHOD FOR THE ASSAY OF OLEORESIN OF ASPIDIUM.*

BY A. RICHARD BLISS, JR.,[1] M. L. PABST,[2] R. W. MORRISON[3] AND E. O. PRATHER, JR.[1]

INTRODUCTION.

In their investigations of the chemical and the biological methods for the standardization of Oleoresin of Aspidium, Pabst and Bliss (1) found certain factors which they believe may lead to varying results when the method of the U. S. Pharmacopœia X (2), the British Pharmacopœia method (3), the Swiss Pharmacopœia method (4), the Fluck modification of the Swiss procedure (5), and the Swiss method as modified by Lyons (6) are employed. They presented a modification of the U. S. Pharmacopœia X method which is more reliable, more accurate and more expeditious. The investigation herewith reported concerned itself with a comparative study of the U. S. Pharmacopœia method and the Pabst-Bliss modification of the U. S. Pharmacopœia X method.

MATERIALS USED.

Four samples of Oleoresin of Aspidium were purchased. Chemical and physical examinations proved the absence of adulterants.

THE PROCEDURES FOLLOWED.

Procedure I: The U. S. Pharmacopœia X Method (2).—"Warm the oleoresin on a water-bath and stir until it is thoroughly mixed. Transfer about 5 Gm., accurately weighed, to a 200-cc. flask, dissolve in 40 Gm. of ether and add 100 Gm. of aqueous solution of barium hydroxide (3 to 100), and shake vigorously for five minutes. Allow the liquids to separate and filter off 86 Gm. of the aqueous fluid Transfer this to a separator, add sufficient hydrochloric acid to produce a distinctly acid reaction, and extract with three successive portions of 30 cc., 20 cc. and 15 cc. of ether. Draw off and combine the ethereal solutions, filter, wash the filter with ether, evaporate and dry the residue to a constant weight of 100° C. This residue weighs not less than 0.96 Gm., corresponding to not less than 24 per cent of crude filicin."

Procedure II: The Pabst-Bliss Modification of the U. S. P. Method (2).—Warm the oleoresin on a water-bath and stir until it is thoroughly mixed. Transfer about *3 Gm.*, accurately weighed to a 250-cc. flask, dissolve in *40 cc.* of ether, add *75 cc.* of a three per cent aqueous solution of barium hydroxide, and shake vigorously for 5 minutes. Transfer this mixture to a separator. Allow the liquids to completely separate, draw off and filter the barium hydroxide layer. Rinse the 250-cc. flask with two 25-cc. portions of a 3 per cent aqueous barium hydroxide solution. After each rinsing, transfer the barium hydroxide solution to a separator, shake for one minute, allow the liquids to separate completely, draw off and filter the barium hydroxide layer. Transfer the combined filtered barium hydroxide solutions to a separator, make distinctly acid (to litmus) with concentrated hydrochloric acid, and extract with three successive portions of 30 cc., 20 cc.

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* Scientific Section, A. Ph. A., Toronto meeting, 1932.

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[2] University of Buffalo.

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and 15 cc. of ether. Draw off the combined ethereal solutions, filter, wash the filter with ether, evaporate and dry the residue to a constant weight at 100° C.

COMPARATIVE RESULTS.

The collaborators' results are assembled in the table below.

TABLE I.—ANALYSES OF OLEORESIN OF ASPIDIUM.

Analyst and Methods.	Sample I.	Sample II.	Sample III.	Sample IV.
Pabst, M. L.				
Mod. Meth.:	23.54*	24.50	23.52	24.42
U. S. P.:	24.76	25.71	24.59	23.61
Morrison, R. W.				
Mod. Meth.:	23.49	24.59	23.49	24.40
U. S. P.:	24.99	25.94	24.30	24.14
Prather, E. O., Jr.				
Mod. Meth.:	23.46	24.57	23.47	24.46
U. S. P.:	24.88	25.62	24.20	23.90
Bliss, A. R., Jr.				
Mod. Meth.:	23.53	24.53	23.52	24.39
U. S. P.:	24.69	25.80	24.46	23.88
Averages:				
Mod. Meth:	23.505	24.55	23.50	24.42
U. S. P.:	24.830	25.77	24.39	23.88
Variation:				
Mod. Meth.:	0.08	0.09	0.05	0.07
U. S. P.:	0.30	0.32	0.39	0.53

* Figures represent the per cent of filicin.

CONCLUSIONS.

The Pabst-Bliss modification of the U. S. Pharmacopœia X method is more accurate, more rapid, less complicated and more expeditious than the U. S. Pharmacopœia method.

The possibilities for error are reduced since the entire aqueous fraction is used instead of an aliquot portion. Less time is required in carrying out the modified method since it is not necessary to determine the specific gravity, or to weigh the barium hydroxide solution, the ether and the portion of the aqueous layer. The use of a smaller quantity of oleoresin results in a smaller amount of residue which requires less time for drying to a constant weight.

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Interest yourself in the Pharmacy Exhibit at the Chicago World's Fair—see this issue of the JOURNAL.

A COLLABORATIVE STUDY OF AN ASSAY PROCEDURE FOR CAMPHORATED TINCTURE OF OPIUM, U. S. P.*

BY A. RICHARD BLISS, JR., E. D. DAVY, W. H. BLOME, N. T. CHAMBERLIN, R. W. MORRISON, R. I. GRANTHAM.

INTRODUCTION.

A comparative study of certain assay procedures for Camphorated Tincture of Opium by Bliss and collaborators (1) demonstrated the decided superiority of one method. The results of this study were presented as a "Report of the Group Committee on Revision, Sub-Committee 6, June 1931" (2). The procedure which yielded the most satisfactory results has been published separately (3).

A critical study of the methods employed by Buchbinder (4), Caines (5), Eaton (6), Kippenberger (7), Puckner (8), St. John (9), Warren and McClosky (10), Warthle (11) and the American Drug Manufacturers' Association, Sub-Committee on Alkaloids and Drug Standards (12), and the results obtained by collaborative work, herewith reported, led to the conclusion that the following method is the most satisfactory and practical procedure for this preparation of opium:

THE METHOD.

To 100 cc. of the sample add 2 cc. of approximately 0.5 *N* sulphuric acid and evaporate the mixture on the steam-bath to a volume of about 10 cc. Transfer the residue to a separator. Wash the evaporating dish twice with approximately 0.5 *N* sulphuric acid using 10 cc. each time and adding the washings to the separator. If necessary, wash the dish with several cc. of a mixture consisting of 85 volumes of chloroform and 15 volumes of alcohol, adding these washings to the separator also. Add about 9 Gm. of sodium chloride and carefully neutralize the solution by adding stronger ammonia by drops, finally adding 8 drops in excess. Add 30 cc. of a mixture consisting of 85 volumes of chloroform and 15 volumes of alcohol. Shake the mixture and then allow it to stand until a complete separation is obtained. Separate the immiscible solvent and run it into a separator (No. 2). Repeat the extraction of the alkaline solution with successive portions of 30, 20 and 20 cc. of the solvent mixture, collecting the extracts in separator No. 2. Test a few drops of the 4th extraction for alkaloids. Both in the initial and final extractions of morphine with organic solvent, test the residue remaining on evaporation of several drops of the 4th shake-out—after evaporation—with Marquis' Solution.[1] *If necessary, repeat the extractions until a negative test is obtained.* In that event, however, increase the quantities and volumes of all subsequent reagents so as to maintain the proportions prescribed.

Add 15 cc. of alkaline salt solution[2] to separator No. 2. Extract the morphine from the chloroform-alcohol solvent by shaking, using 3 successive portions of 15, 10 and 10 cc. of the alkaline solution, respectively, and collecting the extracts in separator No. 3. Wash the combined alkaline salt solution with 10 cc. of chloroform and discard the chloroform. Exactly neutralize the alkaline salt solution by adding hydrochloric acid drop by drop, finally adding 1 cc. in excess. Cool the solution under the faucet and shake it with 10 cc. of chloroform. Remove the chloroform to another separator (No. 4) and shake it with 5 cc. of saturated salt solution to which 3 drops of hydrochloric acid have been added. Discard the chloroform in the fourth separator and add the acid salt solution to the solution in the third separator.

Add stronger ammonia water to the third separator till the solution is just alkaline, and then add 8 drops in excess. Cool the solution under the faucet and extract the alkaloid imme-

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* Scientific Section, A. PH. A., Toronto meeting, 1932.

[1] *Marquis' Solution* (Sulphuric Acid-Formaldehyde): A mixture of 25 parts of concentrated sulphuric acid and 1 part of formaldehyde (40%).

[2] *Alkaline Salt Solution:* Dissolve 25 Gm. of sodium hydroxide in 1000 cc. of distilled water; saturate the solution with sodium chloride, and filter.

diately with successive portions of a mixture consisting of 85 volumes of chloroform and 15 volumes of alcohol. Filter each successive chloroform fraction into a beaker through a piece of cotton wetted with chloroform mixture and wedged into the neck of a small funnel. Discard the liquid in separator No. 3.

Evaporate the chloroformic solution on the water-bath to about 1 cc., but not to dryness. Add 10 cc. of neutral alcohol to the residue and heat to dissolve the alkaloids and to drive off the last traces of chloroform. Add 1 drop of methyl red T. S.; add 0.02 *N* sulphuric acid until the solution is acid with an excess of from 2 to 5 cc. At this stage look out for any undissolved specks. Heat again if necessary. Evaporate most of the alcohol, cool the residue, and add 15 to 20 cc. of recently boiled and cooled distilled water. Titrate the excess acid with 0.02 *N* sodium hydroxide which has been ascertained to be sufficiently free from carbonates to give a sharp end-point with methyl red T. S.

Each cc. of 0.02 *N* H_2SO_4 = 0.00571 Gm. $C_{17}H_{19}O_3N$.

COLLABORATIVE WORK.

Table I gives the collaborators' reports.

TABLE I.—COLLABORATORS' REPORTS.

Analyst.	Gm. Anhyd. Morphine per 100 cc.		Average.
R. L. Greenwood	(1)	0.0422	
	(2)	0.0440	
Ko. Suto	(3)	0.0407	
			0.04270
W. H. Blome	(1)	0.04191	
	(2)	0.04354	
	(3)	0.03831	
			0.04092
E. D. Davy	(1)	0.04030	
	(2)	0.03997	
	(3)	0.04000	
			0.04009
R. W. Morrison	(1)	0.04022	
	(2)	0.04030	
	(3)	0.04028	
			0.04027
N. T. Chamberlin	(1)	0.0388	
	(2)	0.0388	
	(3)	0.0382	
			0.03860
A. R. Bliss, Jr.	(1)	0.04030	
	(2)	0.04010	
	(3)	0.04026	
			0.04022

COLLABORATORS' COMMENTS.

R. I. Grantham, Director of the Analytical Control Laboratory, Sharp & Dohme.—"Mr. R. L. Greenwood and Mr. Ko Suto of this Laboratory have assayed the sample of Camphorated Tincture of Opium which you submitted for comparative study. The method appears to work satisfactorily, and neither of the analysts experienced any difficulties with the formation of emulsions."

W. H. Blome, Scientific Director, Frederick Stearns & Company.—"You will note that the first and second assays check very closely, while the third one departs somewhat markedly from both '1' and '2.' We feel that this method is

considerably better in most respects than the others, although it is rather long for use by others than manufacturers of large quantities of Paregoric."

Edward D. Davy, Professor of Analytical Pharmacy, Western Reserve University.—"I can see nothing wrong with this modification of the former process when applied to Paregoric."

R. W. Morrison, Instructor in Pharmacology, University of Tennessee, Memphis.—"Although a bit long, the method is practical."

N. T. Chamberlin, Assistant Professor of Pharmacy, Western Reserve University.—"The method seems very workable, and I believe will prove very satisfactory."

A. R. Bliss, Jr., Chief, Division of Pharmacology, University of Tennessee Memphis.—"The method has proved to be the most satisfactory and accurate method presented to date. On the whole, the results obtained with the method by seven analysts are unusually close. *The average for the seven collaborators is 0.04040.* The highest value obtained was 0.04400, and the lowest 0.03830; the average for these two values is 0.04110. The Opium used in manufacturing the Paregoric assayed 10.22%. The theoretical amount of anhydrous Morphine in 100 cc. of the Paregoric is, therefore, 0.04088 Gm."

CONCLUSION.

The method herewith reported, which is identical with the method presented at the U. S. P. Committee on Revision meeting of June 1931, excepting for several very minor changes in detail, is decidedly more satisfactory, accurate, practical and expeditious than all other methods reported to date.

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(2) Circular 138, U. S. P. XI, General Committee, July 17, 1931.

(3) Bulletin 21, U. S. P. XI, Sub-Committee on Proximate Assays—No. 6 (December 21, 1931), 76.

(4) Buchbinder, JOUR. A. PH. A., 6 (1917), 618.

(5) Caines, *Pharm. J.*, 118 (1927), 751.

(6) Eaton, *Ibid.*, 109 (1922), 231; *Bur. Chem. Bull.*, 137 (1911), 188; *Ibid.*, 152 (1911), 242.

(7) Z. Kippenberger, *Z. anal. Chem.*, 34 (1895), 307; *Ibid.*, 39 (1900), 290.

(8) Puckner, *J. Am. Chem. Soc.*, 23 (1901), 470.

(9) B. H. St. John, *Bur. Chem., U. S. Dept. Agric. Private Communication* through L. E. Warren, Drug Research Unit, Washington, D. C.

(10) Warren and McClosky, Report of the Assay Procedures for a Number of Drug and Pharmaceutical Preparations, Food, Drug and Insecticide Administration, Washington, D. C., page 77, 1930.

(11) Warthle, *Chem.-Ztg.*, 25 (1901), 290.

(12) "Proceedings A. D. M. A.," (1929), 171; *Ibid.*, (1930), 213.

According to *The British Medical Journal*, "on the occasion of the celebration of the tercentenary of the foundation of Dorpat University, fifty doctors, *honoris causa*, were created. These included Sir A. Smith-Woodward, of the Royal Society; Prof. James Young Simpson, of the University of Edinburgh; Prof. A. Birch-Hirschfeld, of Königsberg; Prof. G. Liljestrand, of Stockholm, and Prof. L. Martin, of Paris."

Prof. F. A. F. C. Went, of Utrecht, and Prof. F. F. Blackman, of Cambridge, have been elected corresponding members of the American Society of Plant Physiologists.

SOME OBSERVATIONS ON THE CONSTANTS OF OIL OF SPEARMINT.*

BY L. E. WARREN.[1]

Several years ago criticisms were received that the U. S. P. standard for carvone in oil of spearmint (not less than 43%) was too low. Likewise the lower limit for optical rotatory power (−38°) was said to be too low. It was claimed that the low carvone limit and the low rotatory requirements of the Pharmacopœia permitted adulteration. It was also claimed that the U. S. P. X method for the assay of carvone in oil of spearmint was unworkable. The fault was said to lie in the use of a 5% solution of sodium acid sulphite as a neutralizing reagent instead of a concentrated solution. By the use of the weaker solution the volume of the reacting mixture becomes so great that it exceeds the capacity of the cassia flask in which the reaction is directed by the Pharmacopœia to be carried out, and the assay cannot be completed. Since these allegations were of considerable importance from the standpoint of the enforcement of the Food and Drugs Act, a study of the situation was undertaken.

Very little information concerning the constants of oil of spearmint has appeared in the literature during the last 10 years. Christensen and Hiner[2] examined four specimens of oil of spearmint grown in Florida during the years of 1929 and 1930, inclusive. They found that the specific gravity varied between 0.9215 and 0.9253; the refractive index from 1.4825 to 1.4897; the optical rotation from −56.09° to −59.075°; and the carvone content from 69.5 to 80.2%.

Oil of caraway, oil of cinnamon and oil of spearmint are directed by the U. S. Pharmacopœia to be assayed by the same method. As applied to oil of spearmint, the method is as follows:

> Place 10 cc. of oil of spearmint, measured from a pipette, in a 100-cc. cassia flask and add 50 cc. of a saturated solution of sodium sulphite which has been carefully rendered neutral to 2 drops of phenolphthalein T.S. by means of a 5 per cent sodium bisulphite solution. Heat the mixture in a bath containing boiling water and shake the flask repeatedly, neutralizing the mixture from time to time by the addition of a few drops of the 5 per cent sodium bisulphite solution. When no coloration appears upon the addition of a few more drops of phenolphthalein T.S. and heating for fifteen minutes, cool to room temperature and, when the liquids have separated completely, add sufficient sodium sulphite solution to raise the lower limit of the oily layer within the graduated portion of the neck. Note the volume of the residual liquid. This measures not more than 5.7 cc., indicating the presence of not less than 43 per cent by volume of carvone.

Eight specimens of oil of spearmint were procured from five dealers in this country,[3] each specimen being supposed to be of good quality. In addition, a laboratory specimen known to be at least 15 years old was rectified by steam distillation and the product included in the examination. Two of the specimens studied were stated by the dealer to be what are known as "Scotch Spearmint" oils. That is, they were produced from a variant of *Mentha spicata* grown in this

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* Scientific Section, A. PH. A., Toronto meeting, 1932.

[1] Food and Drug Administration.

[2] JOUR. A. PH. A., 21 (1932), 147.

[3] Practically no oil of spearmint is imported, all of the supply being produced in this country. Southern Michigan and northern Indiana are the principal producing localities.

country, the original stocks of which were brought from Scotland. The U. S. P. X assay was applied to several of the specimens, but without success, owing to the fact that the volume of the reacting solution became in each case too great to be contained in the cassia flask.[1] The method was modified by the use of a concentrated solution (about 35 per cent) of sodium acid sulphite as a reagent for neutralizing the solution instead of the 5 per cent strength as directed by the Pharmacopœia. A 30 per cent solution also works well. With this modification the method was found to work satisfactorily. In addition to the assay for carvone, the optical rotatory values of the oils at 20°, the indices of refraction at or near 20°, and the densities at $\frac{25°\ C.}{25°\ C.}$ were determined. Some of the specimens were assayed by the U. S. P. IX method. This procedure is the same as the U. S. P. X process except that acetic acid is used instead of sodium acid sulphite to maintain an acid reaction. Some of the specimens contained so much carvone that the assay could not be completed with diluted acetic acid as prescribed by the U. S. P. IX. In these 20% acetic acid was used. The findings are recorded in the accompanying table.

TABLE I.—ANALYSES OF SEVERAL SPECIMENS OF OIL OF SPEARMINT.

Sample.	Density 25° C./25° C.	Refractive Index.	Optical Rotatory Power 20° C.	Carvone (U. S. P. X Method Modified).	Carvone U. S. P. IX Assay (Modified).
A	0.9270	1.4870	−51.83	60.1	61.1
B	0.9248	1.4860	−58.13	60.5	
				59.5	59.5
C		1.4850	−59.65	61.4	58.6
D	0.9232	1.4860	−55.36	63.10	63.9
E*	0.9368	1.4875	−49.99	61.4	
F	0.9245	1.4860		66.1	65.50
G	0.9207	1.4855	−57.12	60.9	59.1
H	0.9221	1.4860	−55.20	57.5	
I	0.9212	1.4810	−45.05	53.6	
				54.1	
U. S. P. Requirements	0.917 to 0.934	1.482 to 1.490	−38° to −56°	Not less than 43%	

* Old specimen rectified. It conforms to the U. S. P. X in all particulars except that its specific gravity is slightly high.

An examination of the findings shows that none of the oils approach the U. S. P. X lower limits in optical rotatory power (−38°) or in carvone content (43%). Since most of the oils assay over 60% of carvone it would appear that the U. S. P. limit for carvone (not less than 43%) might be raised with propriety. However, in order to secure further information the aid of dealers in oil of spearmint was sought.

[1] In 1930, Kassner [JOUR. A. PH. A., 19 (1920), 138] had observed that the U. S. P. X method for the assay of cinnamon oil was unworkable. However, the fact had been noted by the chemists in the Import Office of the Food & Drug Administration considerably earlier (unpublished).

MEMORANDA ON OIL OF SPEARMINT.

The following memoranda were obtained from the records of a dealer in certain essential oils. The two values found in each space represent the highest and the lowest findings for what were considered to be genuine oils for the several different years mentioned. In some cases a third value has been given and the expression "Redist." given after the factor. This means that the oil had been redistilled. It will be noted that the year 1928 is vacant. This is due to the fact that the company had no data for that year, or that the records had been misplaced.

TABLE II.

Year.	Optical Rotatory Value (Degrees).	Refractive Index.	Carvone %.	Specific Gravity.
1921	−42.32	1.4803	44.5	0.9133
	−58.39	1.4895	65.0	0.9260
1922	−49.50	1.4862	57.0	0.9212
	−55.30	1.4905	71.0 Redist.	0.9340 Redist.
			66.0	0.9287
1923	−46.75	1.4870	57.0	0.9225
	−55.50	1.4880	65.0	0.9270
1924	−50.75	1.4875	60.0	0.9258
	−55.20 Redist.	1.4910 Redist.	72.0 Redist.	0.9360 Redist.
	−54.60	1.4895	71.0	0.9350
1925	−44.15	1.4860	56.0	0.9253
	−51.50 Redist.	1.4895 Redist.	66.0 Redist.	0.9340 Redist.
	−52.50	1.4885	64.0	0.9300
1926	−48.00	1.4870	60.5	0.9230
	−53.75 Redist.	1.4910 Redist.	72.0 Redist.	0.9355 Redist.
	−52.00	1.4890	65.0	0.9300
1927	−50.10	1.4845	54.0	0.9213
	−54.25 Redist.	1.4896 Redist.	59.0	0.9332 Redist.
	−52.25	1.4900	59.0	0.9346
1928		No information available		
1929	−47.50	1.4854	51.0	0.9170
	−51.75 Redist.	1.4919 Redist.	70.0 Redist.	0.9380 Redist.
	−53.50	1.4865	60.0	0.9220
1930	−48.50	1.4850	53.0	0.9180
	−55.85 Redist.	1.4900 Redist.	68.0 Redist.	0.9255 Redist.
	−55.50	1.4878	58.0	0.9260
1931	−53.25	1.4870	54.0	0.9226
	−54.25 Redist.	1.4868 Redist.	62.0 Redist.	0.9221 Redist.
1932	−48.75		52.0	
	−60.25		58.0	

An examination of the values in Table II reveals that optical rotatory values of less than −48° were encountered in but four of the eleven years covered by the census. Concerning the carvone content, the dealer stated:

"... we have never seen any genuine American Oils which contain as low as 43% of carvone and it is very seldom we assay a genuine sample where the carvone content, when assayed by the method prescribed in the U. S. P. X, is much under 50. Reference to our records indicates

that in 1921, when growing conditions were normal and the yield per acre particularly high, we assayed two samples, one of which indicated a carvone content of 44.5% and one a carvone content of 47.5%. Without exception, these are the lowest assays we have ever encountered in genuine oil. . . . It is our opinion the minimum limit of carvone content [in the U. S. P. XI] may be raised with perfect safety and with considerable propriety."

Since the chief controversy concerning the constants of spearmint oil had reference to the optical rotatory power and the carvone content another dealer was requested to furnish information concerning his experience with these two values. He gave the highest and lowest findings which had been recorded in his laboratory in each year since 1915. This information is given in Table III.

TABLE III.

	Optical Rotatory Power. Degrees.		Carvone.	
Year.	Low.	High.	Low. %	High. %
1915	−35.48	−50.40	51.0	64.5
1916	−41.70	−59.16	52.5	58.0
1917	−43.93	−50.40	46.0	65.5
1918	−43.83	−46.71	48.0	57.0
1919	−39.90	−53.60	43.0	66.0
1920	−42.80	−49.66	44.0	58.0
1921	−46.41	−53.53	52.0	61.0
1922	−45.33	−53.53	52.0	66.5
1923	−47.08	−57.61	53.0	68.0
1924	−36.21	−56.80	41.5	69.0
1925	−41.30	−55.91	50.0	68.0
1926	−40.71	−51.50	61.0	62.0
1927	−39.95	−55.87	50.0	65.5
1928	−35.27	−56.21	51.0	67.0
1929	−46.91	−50.30	60.0	63.0
1930	−43.10	−57.97	52.0	60.0
1931		−58.45		62.5
1932	−53.50	−58.33	59.5	67.5

It will be noted that the minimum values are sometimes lower than those in Table II. Inquiry was made of the dealer whether in his opinion the two recent specimens having low optical rotatory values (−46.91° for 1929 and −43.10° for 1930) were of poor quality. He replied that both specimens were normal in odor and taste, although the rotation was lower than usually observed. He thought that the variant was probably due to variation in the soil and climatic conditions. Apparently he considered the specimens unadulterated.

So far as these studies indicate, it appears that the minimum standards for optical rotatory power and carvone content in the U. S. P. X for Oil of Spearmint are lower than the market quality of the product warrants. It is believed that an optical rotation of from −48° to −59° and a minimum requirement for carvone content of not less than 50% would be warranted.

The writer extends thanks to the following firms for information concerning the constants for oil of spearmint and for furnishing material for examination: Fritzsche Bros., Inc., Magnus, Mabee & Reynard, Dodge & Olcott, George Leuders & Co., H. C. Ryland, all of New York City, and the A. M. Todd Co., of Kalamazoo, Mich. Also his thanks are due to William Carter for assisting in the routine determinations.

THE ASSAY OF NUX VOMICA BY A METHOXY-DIFFERENCE METHOD.*

BY H. M. BURLAGE[1] WITH M. L. JACOBS[2] AND F. J. LE BLANC.[3]

INTRODUCTION.

The value of Nux Vomica and its preparations as therapeutic agents is well known; they have been and still are recognized in many pharmacopœias including the United States Pharmacopœia.[4] The primary active constituent is Strychnine and efforts have been made to evaluate the drug in terms of this alkaloid. The proposed assay methods, however, have been found to be unreliable due to the interference of another alkaloid, Brucine, which is present in this drug and which has properties quite similar to Strychnine. The United States Pharmacopœia X, recognizes the fallibilities of these proposed methods by stating an assay requirement of not less than 2.5% *total* alkaloids in the place of a Strychnine requirement.

A study of the proposed methods shows that they may be classified as follows: (I) *Gravimetric Methods;* (II) Gravimetric Methods Involving Precipitation; (III) Volumetric Methods with or without Precipitation; (IV) Oxidation Methods Involving I, II, III or Colorimetry.

I. Gravimetric Methods.—Dunstan and Short,[5] Lyons,[6,7] and Farr and Wright[8] have devised methods involving the extraction of the alkaloids and weighing the alkaloidal residues.

II. Gravimetric Methods Involving Precipitation.—Of these methods, that involving the precipitation of the alkaloids as Ferrocyanides and effecting a separation by means of a difference in solubilities of the alkaloidal salts thus formed, is the oldest procedure. Such a method was first proposed by Dunstan and Short,[9] and was modified in turn by Lyons,[10] Holst and Beckurts,[11] Gordin and Prescott,[12] Bird,[13] and Linton.[14] All of these methods are time consuming and have been found to give inaccurate results since an accurate separation of the alkaloids cannot be effected.

In 1893, Nagelvoort[15] proposed a method involving the precipitation of the

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* Scientific Section, A. PH. A., Toronto meeting, 1932.

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[2] Assoc. Professor of Pharmaceutical Chemistry, University of North Carolina.

[3] Asst. Professor of Pharmacy, Division of Pharmacy, South Dakota State College.

[4] United States Pharmacopœia, Tenth Edition, pages 148, 246 and 400.

[5] W. R. Dunstan and F. W. Short, "Yearbook of Pharm." (1883). 475–477.

[6] A. B. Lyons, "Manual of Pharm. Assaying," Haynes and Co., Detroit (1886), page 20.

[7] A. B. Lyons, *Pharm. Rev.*, 20 (1902), 250; *J. pharm. chim.* (6), 16, 139; "Yearbook of Pharm." (1903), 61.

[8] E. H. Farr and R. Wright, *Ibid.* (1906), 226; PROC. A. PH. A., 55, 933.

[9] W. R. Dunstan and F. W. Short, "Yearbook of Pharm." (1883), 469–475.

[10] A. B. Lyons, *Drugg. Circ.*, 30 (1886), 137.

[11] Holst and Beckurts, PROC. A. PH. A., 35 (1887), 524; *Drugg. Circ.*, 31 (1887), 104.

[12] H. M. Gordin and A. B. Prescott, *Am. J. Pharm.*, 71 (1899), 14.

[13] F. C. J. Bird, *Pharm. J.*, 65 (Ser. 4, Vol. XI) (1900), 574.

[14] W. H. Linton, *Ibid.*, 75 (1905), 864.

[15] J. B. Nagelvoort, PROC. A. PH. A., 41 (1893), 165.

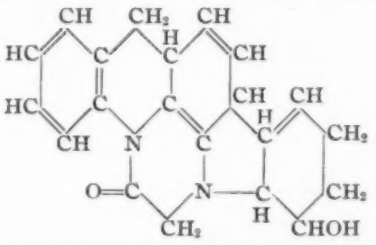
alkaloids as the picrates and in 1928, Stuber and Kejatschkina[1] developed a procedure precipitating them as the silicotungstates.

III. Volumetric Methods with or without Precipitation.—Dragondorff in his early work "Die Chemische Wertbestimmung" outlined a procedure using Potassium Mercuric Iodide as the precipitating agent and as a volumetric solution. Methods along this same line of attack were proposed or modified by Schweissinger,[2] Lyons,[3] Gordin and Prescott,[4] and Dulfilho.[5]

IV. Oxidation Methods.—These methods depend upon the fact that Brucine is more liable to oxidation than Strychnine and by subjecting the residue of mixed alkaloids to oxidizing agents, the former is destroyed or converted in such a manner that the latter may be estimated gravimetrically, volumetrically or colorimetrically. These methods involve the use of nitric acid of varying concentrations or potassium chlorate. Gerock[6] as early as 1889 proposed such a method but it received little consideration until Keller's publication[7] was issued in 1893. Keller's method has been modified or studied by Stoeder,[8] Dowzard,[9] Gordin,[10] Smith,[11] Howard,[12] Reynolds and Sutcliffe,[13] Webster and Pursel,[14] Dott,[15] Heck[16] and Dufhilo.[17] The Nitric Acid-Oxidation Method was official in U. S. P. VIII (page 299) but apparently gave unsatisfactory results and was omitted from the following editions and is now receiving careful consideration by Sub-Committee No. 6 of the Revision Committee of U. S. P. XI.

PURPOSE OF THE INVESTIGATION.

Strychnine (mol. wt. 334.30) has the following formula:



[1] E. Stuber and B. Kejatschkina, *Arch. Pharm.*, 266 (1928), 33; *C. A.*, 22 (1928), 1213.

[2] O. Schweissinger, *Arch. Pharm.* (3), 23 (1885), 529; *Amer. Drugg.*, 14 (1885), 230.

[3] See references 6 and 7, page 298.

[4] H. M. Gordin and A. B. Prescott, *J. Am. Chem. Soc.*, 20 (1898), 706; *Am. J. Pharm.*, 71 (1899), 14. [5] M. E. Dulfilho, *Bull. soc. pharm., Bordeaux*, 66 (1928), 133; YEARBOOK A. PH. A., 17 (1928), 115.

[6] I. E. Gerock, *Arch. Pharm.* (Feb. 1889), 158; PROC. A. PH. A., 37 (1889), 702.

[7] C. Keller, *Z. Oest. Apoth. Ver.* (1893), 587; *Apoth. Ztg.*, 8 (1893), 542; *Z. angew. Chem.*, 35 (1893), 391.

[8] W. Stoeder, *Nederl. Tydsch. Pharm.*, 11, 1899; *Chem. Centbl.* (1889), 506.

[9] E. Dowzard, *Chem. News*, 86 (1902), 292. [10] H. M. Gordin, PROC. A. PH. A., 50 (1902), 336.

[11] F. J. Smith, *Am. J. Pharm.*, 75 (1903), 253. [12] D. L. Howard, *Analyst*, 30 (1905), 261.

[13] W. C. Reynolds and R. Sutcliffe, *J. Soc. Chem. Ind.*, 25 (1906), 512; "Yearbook of Pharm." (1906), 16; *Pharm. J.*, 76 (1906), 555; *Analyst*, 31 (1906), 303.

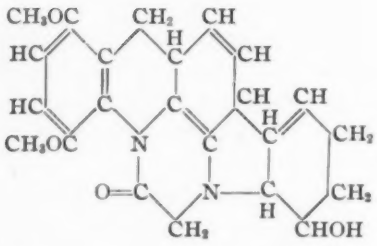
[14] M. H. Webster and R. C. Pursel, *Am. J. Pharm.*, 79 (1907), 1.

[15] D. B. Dott, "Yearbook of Pharm." (1914), 331; YEARBOOK A. PH. A., 3 (1914), 559.

[16] Heck, *Pharm. Ztg.*, 69 (1924), 240; YEARBOOK A. PH. A., 13 (1924), 451.

[17] E. Dufhilo, *Bull. soc. pharm., Bordeaux*, 65 (1927), 7; YEARBOOK A. PH. A., 16 (1927), 564.

and Brucine (394.346):



It will be observed that Brucine differs from Strychnine in chemical composition by two Methoxy groups, (CH_3O) which have been substituted for two hydrogens in the Strychnine molecule. A study of the literature revealed that no method has been proposed for the determination of Brucine in Nux Vomica by ascertaining the Methoxy value of the alkaloidal residues obtained upon the extraction of the crude drug or preparations of the drug and subsequently the amount of Strychnine by difference. The purpose of this investigation, therefore, was to study the possibilities of such a procedure.

As early as 1885, S. Zeisel[1] proposed a method of differentiating essential oils by estimating the proportion of Methoxy or equivalent alkyl radicals by treating with hydriodic acid. The substances are heated with concentrated HI and the liberated alkyl halide is absorbed in an alcoholic solution of silver nitrate according to the following reaction:

$$RI + AgNO_3 = AgI + RNO_3$$

From the weight of the silver iodide produced the amount of the alkyl radical may be calculated as follows:

$$\text{Wt. of AgI} \times 0.132 = \text{wt. of } CH_3O$$

Zeisel's original method was found to give inaccurate results chiefly because the acid might contain sulphur and phosphorous compounds and there is danger of the acid distilling over into the silver nitrate solution. Accordingly the method has been modified by Benedict and Grüssner,[2] Herzig,[3] Gregor,[4] Ehmann,[5] Hewett and Moore,[6] Perkin,[7] Kaufler[8] and Kropheschek.[9]

Instead of weighing the silver iodide formed, Gregor[4] suggested the absorption of the alkyl halide in a solution of known silver content and determining the excess silver in the solution after the silver halide was filtered off and washed. A 0.1 *N* alcoholic solution of silver nitrate is prepared by dissolving approximately 17 Gm. of the pure salt in thirty cubic centimeters of distilled water and then diluting to

[1] S. Zeisel, *Monatsh.*, 6 (1885), 989.
[2] Benedict and Grüssner, *Chem. Ztg.*, 13 (1889), 872.
[3] J. Herzig, *Monatsh.*, 9 (1888), 544.
[4] G. Gregor, *J. Soc. Chem. Ind.*, 17 (1898), 609.
[5] L. Ehmann, *Chem. Ztg.*, 14 (1890), 1767.
[6] J. T. Hewett and T. S. Moore, "Proc. Chem. Soc.," 8, 101; *Analyst*, 27 (1902), 126.
[7] W. H. Perkin, *J. Chem. Soc.*, (T) 83 (1903), 1367.
[8] F. Kaufler, *Monatsh. f. Chem.*, 22 (1901), 1105; *Analyst*, 27 (1902), 126.
[9] W. Kropheschek, *Monatsh. f. Chem.*, 25 (1904), 583.

a liter with absolute aldehyde-free alcohol. The solution is finally standardized against 0.1 *N* potassium thiocyanate after acidifying slightly with nitric acid.

EXPERIMENTAL WORK.[1]

After conducting a large number of preliminary experiments the following method was devised which seems to have definite possibilities:

A. Extraction of the Drug.—The drug in No. 20 powder was extracted by the following methods:

1. As directed in the U. S. P. X, page 247.

2. Procedure as described in *Bulletin 23*, page 81 of Sub-Committee No. 6 of the Committee of Revision of the Pharmacopœia: "Introduce 15 Gm. of Nux Vomica in No. 20 powder, into a 250-cc. Erlenmeyer flask. Add 150 cc. of a mixture of 2 volumes of ether and 1 volume of chloroform, agitate and allow to stand 2 minutes, then add 10 cc. of Stronger Ammonia Water and agitate thoroughly. Stopper the flask securely and shake frequently, but gently, during one hour and let stand 12 hours or over night in a cool place. At the expiration of this period, shake the flask gently for 15 minutes, and then let stand to allow the mixture to separate. Decant 100 cc. of the liquid (representing 10 Gm. of Nux Vomica), into a 100-cc. measuring cylinder and transfer it to separatory funnel, rinsing out the cylinder with a little chloroform and adding the rinsings to the funnel. Add 40 cc. of approximately normal sulphuric acid to the separatory funnel and shake the mixture gently for 5 minutes, then allow the liquids to separate and draw off the acid layer into another separatory funnel. Repeat the shaking out with successive portions of 25 and 15 cc. of acid of the same strength. To make sure that all of the alkaloid is extracted, it is well to shake a fourth time with 5 cc. of acid and test for complete extraction of the alkaloid by shaking 0.5 cc. of this acid solution with Mayer's Reagent. If it still shows alkaloids, shake again with 5-cc. portions of acid until all of the alkaloids are removed. To the combined acid solutions in the separator, add a small piece of red litmus paper and 50 cc. of chloroform, and then follow with sufficient ammonia water to make the aqueous layer alkaline, after gentle shaking, then add 2 or 3 cc. more of the ammonia. Shake thoroughly but gently for 10 minutes and allow the liquids to separate. Draw off the chloroform into an Erlenmeyer flask of 200–250 cc. capacity, and repeat shaking out with 30- and then with 15-cc. portions of chloroform until all of the alkaloid is extracted. Test for completeness of extraction by evaporating 0.5 cc. of the chloroform solution to dryness. Warm the residue with 2 drops of diluted hydrochloric acid and 1 cc. of water, transfer to a test-tube and add a few drops of Mayer's Reagent. Not more than a slight turbidity should be produced."

3. Introduce 15 Gm. of Nux Vomica in No. 20 powder into a Palkins-Watkins Automatic Extractor, Type S,[2] pack firmly and moisten throughout with chloroform. Carefully add a mixture of 20 cc. of ether, 10 cc. of alcohol and 10 cc. of stronger ammonia water, stopper well and allow to macerate over night. Extract for 3–4 hours or until the extraction liquid is no longer colored. Transfer the chloroformic liquid to a separatory funnel, add 40 cc. of approximately normal sulphuric acid and proceed as directed in A-2.

The final combined chloroformic extracts obtained by A-1, A-2 or A-3 are received into a tared Erlenmeyer flask (125–150 cc.). Carefully evaporate almost to dryness on a steam-bath and dry the residue to constant weight at 105–110° C., recording all weights.

B. The Methoxy Determination (*See Fig. 1*).—To flask No. 2 containing the alkaloidal residue obtained and dried as in (A), is added 10 cc. Hydriodic Acid (Sp. Gr. 1.5 to 1.7) and 5 cc. of Acetic Acid (8%). The flask is then immersed in glycerin contained in a beaker (1000 cc.), which is placed upon an asbestos pad set upon a tripod. The glycerin bath is maintained at a temperature of 130–140° C. Carbon dioxide furnished from a tank is bubbled into a flask No. 1

[1] The writers wish to express their appreciation to Messrs. R. K. Miller, C. H. Bender, J. T. Mullins and J. E. Ball, Senior Students in the School of Pharmacy, Purdue University, for their assistance in conducting many of the preliminary experiments necessitated by this investigation.

[2] Palkins and Watkins, *Ind. Eng. Chem.*, 19 (1927), 535.

containing silver nitrate solution (10%) at the rate of 120–150 bubbles per minute. This flask is connected to flask No. 2 and the alkyl halide generated in this flask is carried by the stream of carbon dioxide into an empty container No. 3. Container No. 4 is provided with distilled water, flasks Nos. 5, 6 and 7 hold a 2% solution of Arsenious Acid and 2% of Potassium Carbonate; No. 8 receives distilled water. Containers Nos. 3–7 are immersed in a water-bath maintained at 40–50° C. Receiver No. 9 is an Erlenmeyer flask (125–150 cc.) containing 40 cc. of 0.1 *N* alcoholic Silver Nitrate solution and No. 10 is a flask of the same size provided with 10 cc. of the standard silver solution; in each case the solution is slightly acidified with nitric

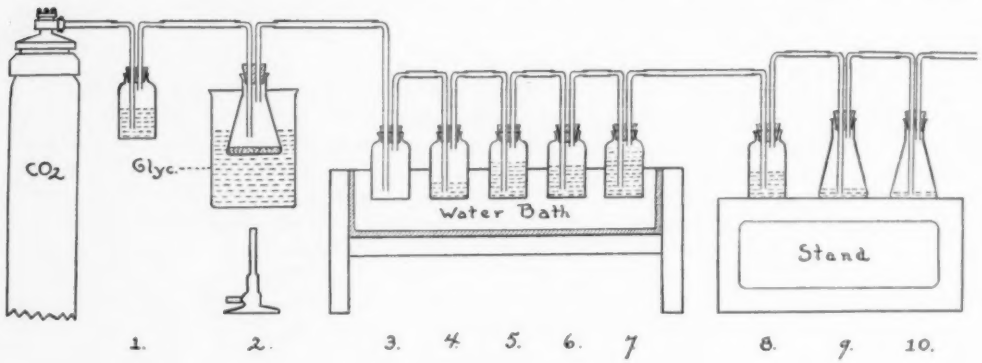


Figure. I.

acid. The reaction is allowed to continue for two hours after which time the flasks Nos. 9 and 10 are disconnected and the latter flask is connected to the apparatus and gas allowed to pass 15 minutes longer to be assured that the alkyl halide has been completely washed from the apparatus. The contents of flasks Nos. 9 and 10 are combined and filtered through a tared Gooch crucible provided with an asbestos mat and the residue after washing with acidulated water is dried to constant weight at 105–110° C. The weight of Brucine may be calculated as follows:

$$X \text{ (wt. of Brucine)} : (\text{wt. of Residue} \times 0.132) :: \underset{\text{Brucine}}{394.346} : \underset{\text{Methoxy Group}}{62.048}$$

(Mol. wt. Brucine; Mol. wt. of Methoxy Group)

or: wt. of Silver Iodide × 0.83970 = wt. of Anhydrous Brucine.

The per cent of Brucine is estimated as follows:

$$\frac{\text{Wt. of Brucine found} \times 100}{\text{Wt. of sample}}$$

The per cent of Strychnine is estimated:

$$\frac{\text{Constant wt. of total alkaloids} - \text{wt. of Brucine found} \times 100}{\text{Wt. of sample}}$$

The filtrate and washing are carefully reserved and the excess of silver is titrated with 0.1 *N* Potassium Thiocyanate, using Ferric Ammonium Sulphate as an indicator. 1 cc. of 0.1 *N* $AgNO_3$ = 0.01972 Gm. Anhydrous Brucine.

SAMPLES USED IN THE INVESTIGATION.

Series O.

This sample consisted of a commercial product purchased from S. B. Penick and Company. Fineness labeled as No. 40.

Series I.[1]

Sample 1.—A commercial sample of Nux Vomica purchased from S. B. Penick and Company. Fineness labeled as No. 20.

[1] Bulletin 20, page 73, Sub-Committee No. 6 of Revision Committee of the U. S. P.

Sample 2.—Exhausted Nux Vomica No. 20 (0.028% total alkaloids)..... 177.445 Gm.
Strychnine Sulphate (856.75) in fine powder..... 4.000
Brucine Sulphate (1012.81) in fine powder..... 1.800

Sample 3.—Exhausted Nux Vomica (see Sample 2)..... 180.000 Gm.
Strychnine Sulphate..... 1.700
Brucine Sulphate..... 4.400

Series II.[1]

Sample 1.—Exhausted Nux Vomica No. 20 powder (0.056% Total Alkaloids..... 330.000 Gm.
Strychnine Sulphate..... 7.500
Brucine Sulphate..... 3.500

Sample 2.—A commercial sample purchased from S. B. Penick and Company. Labeled as No. 20 powder.

Sample 3.—Exhausted Nux Vomica (see Series II, Sample 1)..... 330.000 Gm.
Strychnine Sulphate..... 3.500
Brucine Sulphate..... 3.500

Series III.

Sample 1.—Exhausted Nux Vomica..... 120.000 Gm.
Strychnine Sulphate..... 1.200
Brucine Sulphate..... 1.200

TABLE OF RESULTS.

	Weight of Total Alkaloids.			Per Cent Brucine.				Per Cent Strychnine.				
Series.	U. S. P. X ext. No. 1.	Extraction method No. 2.	Extraction method No. 3.	Calculated.	Grav. detn.	Vol. detn.	Av. grav. and vol.	Calculated.	Collabr. results sub-comm. 6	Grav. detn.	Vol. detn.	Av. grav. and vol.
O	0.1403*	....	....	...	1.21	1.36	1.29	...	...	1.60	1.45	1.52
	0.2130**	....	....	...	1.29	1.43	1.36	...	...	1.55	1.40	1.48
					Av. 1.25	1.39	1.32			1.57	1.43	1.50
	....	0.3041	....	...	1.00	1.11	1.06	...	...	2.04	1.93	1.98
	....	0.3086	....	...	..	1.14	1.14	...	...	..	1.95	1.95
					Av. 1.00	1.12	1.10			2.04	1.94	1.96
	....	....	0.4930	...	1.07	1.14	1.10	...	...	2.21	2.15	2.18
	....	....	0.4945	...	1.04	1.08	1.06	...	...	2.26	2.22	2.24
					Av. 1.06	1.11	1.08			2.23	2.19	2.21
I—1A	....	....	0.4080	...	0.85	0.88	0.87	...	1.274	1.87	1.84	1.86
1B	....	....	0.4022	...	0.83	0.81	0.82	...	...	1.86	1.87	1.86
1C	....	....	0.4142	...	0.94	0.98	0.96	...	...	1.82	1.79	1.81
					Av. 0.87	0.82	0.88			1.85	1.83	1.84
1D	0.1534*	....	....	...	1.02	1.15	1.08	...	...	2.05	1.92	1.98
1E	0.1502*	....	....	...	1.01	1.08	1.04	...	...	1.99	1.92	1.95
					Av. 1.02	1.11	1.06			2.02	1.92	1.96
2A	....	....	0.3962	0.779	0.94	0.98	0.96	1.718	1.701	1.70	1.66	1.68
2B	....	....	0.3768	...	0.69	0.79	0.74	...	...	1.82	1.73	1.77
					Av. 0.82	0.88	0.85			1.76	1.70	1.74
2C	0.1344*	....	....	...	0.90	0.98	0.94	...	...	1.79	1.80	1.79
2D	0.1340*	....	....	...	0.90	0.90	0.90	...	...	1.78	1.78	1.78
					Av. 0.90	0.94	0.92			1.78	1.79	1.78
3A	....	....	0.3942	1.855	1.91	1.87	1.89	0.727	0.619	0.71	0.76	0.74
II—1A	....	....	0.3809	0.827	0.70	0.75	0.73	1.744	1.670	1.84	1.78	1.81
2A	....	....	0.3869	...	1.14	1.04	1.09	...	1.240	1.62	1.54	1.58
3A	....	....	0.2500	0.837	0.68	0.77	0.73	0.839	0.801	0.98	0.90	0.94
III—1A	....	....	0.2388	0.763	..	0.75	..	0.766	...	..	0.84	..
	....	....	0.2390	...	..	0.75	0.72	...	...	0.86	0.84	0.85
					Av. 0.00	0.75	0.72	...	...	0.86	0.84	0.85

* 50 cc. aliquot from total volume of 150 cc.
** 100 cc. aliquot from total volume of 100 cc.

[1] Bulletin 23, page 79, Sub-Committee No. 6 of Revision Committee of the U. S. P.

It has been found that the following precautions are necessary and important:

1. Between each determination the tube leading into the silver nitrate solution in flask No. 9 should be cleaned by allowing to stand in concentrated Nitric Acid over night and rinsing with distilled water.

2. Careful regulation of the speed of the stream of carbon dioxide and the temperature of the baths is necessary. It has been found that the formation of a black residue often occurs if the temperature becomes too high and the speed of the gas is too great. The gases are, thereby, not allowed to cool sufficiently and the silver nitrate may be reduced.

3. Reagents used should be pure. This is especially true of the Hydriodic Acid used. It should not contain free iodine, sulphur or phosphorous compounds.

4. All connections should be tight.

5. Analytical technique should be employed at all times.

COMMENTS.

1. It has been found that, in general, the volumetric determination (for Brucine) gives higher results than the gravimetric method.

2. The values for Brucine are higher than the calculated amount in the known samples; this might indicate that the residues are not sufficiently pure, therefore contain impurities which tend to give high Methoxy values. The Strychnine values, however, are not so affected.

3. It will be observed that with commercial samples the extraction method No. 3 gives higher results than by other extraction methods used, indicating that the usual methods of extraction might not be sufficiently thorough or that this method extracts impurities which tend to give high results. Time did not permit a further study which might clarify the situations involved in 2 and 3 (see Series O, Series I, IA, IB, IC, Series II, IIA).

4. The values for Strychnine content on samples of known composition are quite in accord with the calculated values and compare well with those values obtained with the samples by the Oxidation method directed in *Bulletin 23 of Sub-Committee* No. 6 (see page 299).

SUMMARY.

1. Three extraction methods are studied. The use of the automatic extractor gives higher results than the usual methods of extraction.

2. A method is proposed whereby alkaloidal residues from Nux Vomica may be examined for Brucine content by ascertaining the Methoxy value of the residue of known weight and the amount of Strychnine by difference.

3. The values for Brucine are apparently affected by the character of the residue. This fact does not seem to affect the values for Strychnine content since the experimental results check well with calculated values.

4. The writers deem the method worthy of consideration in the commercial laboratory where routine analyses are conducted on Nux Vomica by a single worker or a group of workers since the development of technique is necessary.

5. The method proposed is not as rapid but apparently is as accurate as the oxidation method under consideration by Sub-Committee No. 6.

6. The fact that results may be checked gravimetrically as well as volumetrically is an advantage.

THE LEAF OILS OF WASHINGTON CONIFERS: VI. ABIES NOBILIS.*

BY E. V. LYNN AND SUKEO NAKAYA.

Few trees of Washington forests can equal *Abies nobilis* in grandeur and nobility of form and appearance, so that the designation "noble fir" is an appropriate one. The lumbermen also call it red fir and frequently larch, although there is little reason for either name. It is most abundant on the western slopes of the Cascade range at elevations of 2500 to 5000 feet.

It is a tall, straight tree, ranging up to 220 feet in height and to a diameter of 6 feet. The bark is purplish in color and 1–2 inches thick, being divided by narrow ridges. In younger trees the crown extends well toward the ground and the bark is gray, thin and flat, with conspicuous resin-blisters. The leaves occur singly, without a distinct petiole, and are turned upward so they appear to grow from the top sides of the branches. The leaves of the upper crown are sharply pointed and less than an inch in length but the lower needles are notched at the tip and longer. The cones are very distinctive in that they stand upright and that the extruding, sharply pointed bracts completely cover the outer surface. They are 4–7 inches long and 2–3 inches in diameter.

No investigation has hitherto been made of the leaves, but the balsam was examined by Rabak[1] to a limited extent.

The samples of leaves used in this investigation were gathered on the west side of the Cascade Mountains about eighty miles from Seattle. They were immediately distilled with steam, giving 1025 cc. of oil from 780 pounds. By cohobation of the aqueous distillate, a further 55 cc. was obtained, making a total yield of about 0.3 per cent. It should be noted here that the aqueous distillate was acid and turned to a red color after standing, but this color disappeared upon boiling.

The freshly distilled oil was greenish yellow, turning slightly darker on standing, and possessed a strong, limonene-like odor. It did not deposit any solid when exposed to a freezing mixture for several hours. The specific gravity at 20° C. was 0.8552; the index of refraction at 20° C. was 1.4780 and at 25° C. 1.4744; the optical rotation at 25° C. in a 100-mm. tube was +3.89°; the acid number of 2.61 corresponded to 0.28 per cent acetic acid; the ester number of 1.12 corresponded to 0.39 per cent of bornyl acetate. By the usual methods, it was found that the oil contained about 4 per cent of substances soluble in sodium bisulphite and less than 1 per cent of phenols. One can conclude that about 95 per cent of the oil consists of hydrocarbons or alcohols. Furfural was found in quantity in the aqueous distillate.

The whole oil was fractionated and repeatedly refractionated at ordinary pressure, the higher portions at 45–50 mm.

The first and second fractions were found to contain 1-α-pinene which was converted to the nitrosochloride and to the nitrolpiperidide, melting at 119° C. The third consisted chiefly of 1-β-pinene as shown by oxidation to nopinic acid,

* Scientific Section, A. PH. A., Toronto meeting, 1932.

[1] *Pharm. Review*, 23 (1905), 46.

Fraction.	Amount.	n_{D}^{23}.	d_{25}.	$[\alpha]_{D}^{25}$.
155–160° C.	5.0%	1.4729	0.8501	...
160–163	4.0	1.4725	0.8530	−17.75°
163–168	22.0	1.4749	0.8575	−20.67
168–173	37.0	1.4772	0.8556	−23.50
173–177	6.0	1.4810	0.8444	−32.50
177–179	3.5	1.4812	....	...
179–203	4.0	1.4839	0.8595	...
At 45–50 mm.				
94–145	5.0	1.4825	0.8880	−34.50
145–190	2.0	1.4982	0.8942	...
190–208	2.0	1.5051	0.9389	...
208–216	6.0	1.5125	0.9389	...
Residue	3.5	....	....	...

melting point 124–125° C. The second and third fractions undoubtedly contained some camphene, but this could not be proved. Hydration gave the typical odor of isoborneol, which could not be separated in the solid state, and oxidation of the hydrated mixture produced the characteristic odor of camphor, although neither oxime nor semicarbazone could be prepared.

The fourth and largest portion was mainly 1-β-phellandrene, as was also the fifth. The nitrite, which was easily produced from either by the usual methods, melted at 99–100° C. No limonene or dipentene could be detected in any of the terpene fractions, in spite of the characteristic odor.

The portions boiling at 145–208° C. under 45–50 mm. pressure contained most of the ester. After saponification, the aqueous solution was neutralized and precipitated fractionally with silver nitrate. The first 0.5 Gm. contained 43.7 per cent of silver, corresponding to caprylic acid. The chief acid, however, was acetic, identified by odor and conversion to ethyl acetate.

The oil therefore contains approximately 78 per cent of terpenes, over half of which is 1-β-phellandrene and the balance the two pinenes and probably camphene. The other 22 per cent is mostly sesquiterpenes or derivatives, with small amounts of phenols, of esters of acetic and possibly caprylic acids, and of aldehydes and ketones.

SEATTLE, WASH.,
October 1, 1932.

AMPHIACHYRIS DRACUNCULOIDES (DC.) NUTT.*

A STUDY OF THE FLOWERING BRANCHES.

BY LOYD E. HARRIS[1] AND INA GRIFFITH.[2]

This plant has been called *Brachyris dracunculoides* DC., *Brachyris ramosissima* Hook, and *Amphipappus dracunculoides*, Torr. and Gray (1). Local names used

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* Scientific Section, A. PH. A., Toronto meeting, 1932.

[1] Professor of Pharmacy.

[2] Part of a thesis submitted to the Graduate Faculty of the University of Oklahoma in partial fulfilment of the requirements for the degree of Master of Science in Pharmacy.

in Oklahoma are Broom Weed and August Flowers. It was collected by Nuttall in 1818, on the edge of ponds near Salt River in Arkansas (2). He gave it the present name in 1841 (3). It is widely distributed in Missouri, Kansas, Texas, New Mexico and Oklahoma (4).

Amphiachyris dracunculoides Nutt. has been used many years as a home remedy for coughs and colds. It is administered in the form of a syrup which is prepared by making an infusion from the dried branching portion of the plant including the flowers and leaves. To the tea thus obtained a sufficient quantity of sugar is added to produce a thick syrup. A survey of the literature revealed nothing as to constituents present in this plant.

EXPERIMENTAL.

The flowering top including the small branches and leaves were collected in September while in full bloom, and allowed to dry indoors. This material was then ground to a number 20 powder.

EXTRACTION WITH SELECTIVE SOLVENTS.

Two samples, each weighing 40 Gm. were used and the following results were obtained:

Solvent in Order Used.	Sample No. 1 Wt. in Gm.	Sample No. 2 Wt. in Gm.	Per Cent Sample No. 1.	Per Cent Sample No. 2.
Petroleum ether	2.0	2.0	5.00	5.00
Ether	3.1	3.0	7.75	7.50
Dehydrated alcohol	5.5	5.5	13.75	13.75
Water	5.6	5.9	14.00	14.75
Dil. alkali (0.1 per cent)	4.1	3.9	10.25	9.75
Dil. acid (1.0 per cent HCl)	1.7	2.3	4.25	5.75
Residue	17.8	17.1	44.50	42.75
Total	39.8	39.7	99.50	99.25

The petroleum-ether extract was fatty in nature and became semi-solid on standing. The saponification value of this extract was 158.36 and the iodine value (Hanus) was found to be 38.31.

ASH.

Ash determinations, using three samples were made, with the results tabulated below.

	Wt. of Sample.	Total Ash.	Per Cent.	Water-Soluble Ash. Grams.	Per Cent.	Acid-Soluble Ash. Gm.	Per Cent.
1	1.9192	0.0995	5.18	0.0331	1.72	0.0368	1.91
2	1.9958	0.1063	5.32	0.0402	2.01	0.0393	1.96
3	1.5893	0.0820	5.16	0.0317	1.99	0.0301	1.89
Average	1.8347	0.0966	5.22	0.0350	1.907	0.0354	1.92

MOISTURE.

Moisture determinations were made using the xylene and oven methods.

	Xylene Method (5).		Oven Method (6) (100° C.).	
	Wt. of sample.	Per cent moisture.	Wt. of sample.	Per cent moisture.
1	9.3678	2.12	9.6933	11.23
2	10.0701	1.98	9.2340	10.90

ALCOHOLIC EXTRACT.

It was believed that the alcoholic extract contained some important constituents. Accordingly thirty-two and three-fourth pounds (14.85 Kg.) of the ground plant material were extracted with U. S. P. alcohol.

The alcohol was recovered by distillation, and the residue extracted with successive portions of petroleum ether to remove any fatty material that had been extracted.

Five hundred Gm. of the residue were washed with distilled water, which process was performed with difficulty since the mass was quite adhesive. The washings were evaporated to a syrupy consistency on a water-bath. During the evaporation a brown material settled to the bottom of the dish. Finally this material was separated from the solution by decanting the clear liquid. The brown material hardened on standing, was soluble in dilute alkali, slightly soluble in hot water, alcohol and chloroform, and insoluble in ether. When tested with Fehling's solution, reduction was observed after a solution of the material had been heated with dilute hydrochloric acid.

The syrupy liquid obtained by decantation was light brown in color and had a very bitter taste. A portion of this was extracted with amyl alcohol. The volume of the alcoholic extract was reduced under diminished pressure. When this concentrated amyl alcohol was set aside and cooled a yellow precipitate formed. The first precipitate obtained in this way, after drying in a desiccator, was a powder. In succeeding attempts it was always pasty. This material was soluble in hot water and hot alcohol but insoluble in ether, chloroform and benzene.

When a solution of this material was tested with Fehling's solution a deposit of red cuprous oxide was obtained. However, when an aqueous solution of this material was treated with lead subacetate, filtered, treated with hydrogen sulphide to remove the lead, the excess hydrogen sulphide removed by boiling, and allowed to react with Fehling's solution, there was no reduction.

This solution was hydrolyzed by the addition of a few drops of hydrochloric acid and boiling for one minute. The solution thus obtained reduced Fehling's solution but no osazone could be obtained. During the hydrolysis a brown material separated which hardened on drying. It melted at 115° C. When mixed with water and titrated with $N/50$ NaOH the results indicated it to have acidic properties.

RESIDUE FROM AMYL ALCOHOL EXTRACT.

The syrupy liquid remaining after extraction with amyl alcohol was next examined. It did not reduce Fehling's solution until after it was hydrolyzed. During the hydrolysis a brown material separated, having the same properties as the similar material mentioned above.

After decolorizing solutions of unhydrolyzed and hydrolyzed materials with "norite" they were examined with a polariscope. The first was inactive whereas

the hydrolyzed solution had a specific rotation of $-14.7°$. From this same hydrolyzed material an osazone was obtained and after recrystallization a melting point of 212° C. was determined.

There are three known osazones having this melting point, namely, glucosazone, fructosazone, mannosazone. Attempts to obtain saccharic acid from the sugar were unsuccessful. A ketose was indicated by a positive Seliwanoff reaction, however, no osazone could be obtained using methyl phenylhydrazine (7).

The presence of a glucoside has been definitely established but its composition has not yet been determined. Work is to be carried on in this direction during the year 1933.

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(5) Jenkins and DuMez, "Quant. Pharm. Chem.," page 229.
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(7) Armstrong, "The Simple Carbohydrates and Glucosides," 4th Edition, page 96.

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THE STORY OF THE ISOLATION OF CRYSTALLINE VITAMIN D_1.

A REVIEW ARTICLE BY K. JOSEPHSON IN *Farm. Revy*, 30 (1931), 566–571.

TRANSLATED BY C. S. LEONARD.

Translator's Note: That Windaus should have been successful in isolating crystalline vitamin D_1 is not surprising. Sterol chemistry has occupied his attention since his early teaching days. His *Habilitationschrift* as Privat Dozent at Freiburg in 1903 was on the subject: Cholesterol. Indeed Freiburg had a tradition in the field, for van Oordt in 1901 under Kiliani's tutelage presented a doctor's thesis from Gatterman's laboratory on cholesterol, as did, in 1905, Windaus' pupil, Gustav Stein. Meanwhile, Windaus began publishing a series of articles in the *Berichte* on the chemistry of this sterol, which led to partial formulation of the structure in 1908. A pupil, Adamla, in 1911 wrote a further dissertation on the subject and again in 1919, 1923 and 1925, Windaus published work on phytosterols. So the important phytosterol, ergosterol, was but one member of a family familiar to this chemist. He began to report on the study in 1923. It was but natural that he should become interested in the subject of isolation of pure crystalline vitamin when the occurrence of the D vitamin had been traced to the sterol portion of the unsaponifiable fraction of fats. This sterol fraction is largely cholesterol and Hess and Weinstock had shown that cholesterol could be activated by light but *not* if pure. The patience and skill which won a Nobel prize is recorded below:

In volume 489 of *Liebig's Annalen* (page 252) Windaus reports that in his work upon ergosterol irradiated with ultraviolet light he has succeeded in obtaining a crystalline vitamin which he calls vitamin D_1. As such a result in the field of vitamin research so intensively followed in recent years ought to interest pharmaceutical workers, a summary of the more essential findings is given.

In January 1927, Windaus (with Hess) determined that ergosterol on irradiation with ultraviolet light forms quite an active antirachitic substance, the D vitamin. From that time an intensive study went on in Windaus' laboratory for the isolation of the vitamin in pure crystalline

form. In the work now published (1931), Windaus summarizes the many researches in various directions made to gain the end sought.

As a first step he and his colleagues found that with long-continued irradiation ergosterol wholly decomposed, and also that with continued irradiation the D vitamin formed likewise disappeared. Of great practical importance was the discovery that all the photochemical reaction products arising on irradiation, in contrast to the unchanged ergosterol, were not precipitable with digitonin, and hence could be separated quantitatively from the unchanged ergosterol. On the basis of properties displayed by the irradiation products, in particular from their optical properties, it was concluded that the photochemical reaction of conversion initiated by the irradiation led to many products and that from the amorphous resin formed no crystalline product could be separated although many techniques were used.

So they turned to another method of approach. *First*, the action of visible light in the presence of a sensitizer such as eosin was studied. Wholly inactive products were obtained. Even attempts to activate in a thermal way, heating to 225–300°, were in vain. This was scarcely surprising for it has since been found that even heating to lower temperatures than the above destroys D vitamin. In the attempts to gain new reaction products by the aid of well-defined chemical reactions such as oxidation, hydrogenation, dehydrogenation, dehydration and isomerization, many new crystalline compounds were obtained which doubtless were of interest for increasing our knowledge of the chemistry of ergosterol but appeared useless for solving the actual vitamin question, for not one of them, either before or after irradiation, displayed any D vitamin activity.

On the basis of these negative results they went back to the study of ultraviolet irradiation of ergosterol. It was observed that the presence or absence of oxygen in the irradiation experiments was of great importance as regards the composition of the reaction products. Analytical studies of the products obtained, almost always showed that they were richer in oxygen than the starting materials in case oxygen had been present in the experiment.

Since it might be only the presence of such oxygen richer compounds which hindered crystallization of D vitamin, it seemed worth while to investigate the possibiity of getting positive results by a full exclusion of oxygen both in irradiating and in the after treatment of the reaction products during the isolation of the vitamin. So they worked in an atmosphere of oxygen-free CO_2 or in a high vacuum. In this way they got a product with about a 60% photochemical conversion of the ergosterol, which showed a high D vitamin action and was completely free from oxidation products. But here also no crystalline substance could be isolated. The product consisted of a mixture of ergosterol isomers. On the basis of its behavior to various reagents it was concluded that the vitamin must contain a system of conjugated double bonds and also an hydroxyl group. On distillation in high vacuum the substance lost most of its antirachitic activity. (This is noteworthy for Bourdillon later succeeded in isolating in this manner a substance called *Calciferol* which crystallizes readily and is strongly antirachitic.) According to Windaus no other physical method of separation of many tried led to a crystalline substance.

Since this type of experiment failed to yield pure vitamin they next tried to make crystalline derivatives of the vitamin. Many esters of the irradiation products were prepared; not one of these gave the desired result. But Windaus made the interesting observation that the esters of the vitamin with acetic acid and with palmitic acid were physiologically active while esters of acids not normally occurring in the body possessed no antirachitic activity.

As studies with the non-oxidized 60% conversion product were a failure, finally the product resulting from short irradiation periods was studied. On the assumption that, in the first photochemical change of ergosterol, only one reaction product is formed and that this is identical with the vitamin, it might be possible to isolate the vitamin from short-term irradiation products of about 25% conversion for probably only unchanged ergosterol precipitable by digitonin would be mixed with the vitamin. Yet no crystalline substance was obtained in this way. The preparation obtained did not appear essentially different from preparations got by medium-long irradiation periods. So it is likely that even in the first photochemical change of ergosterol many reaction products are formed.

Now consideration was given to irradiation with monochromatic light or at least with filtered radiation, hoping thereby to arrive at a single reaction product. In these experiments they used (1) unfiltered mercury arc light, (2) light from a magnesium spark with maximum in-

tensity between 278 and 280 mμ and a weak intensity below 277 mμ and in the region 295 to 313 mμ, (3) mercury arc light filtered through uviol glass double filters passing only wave-lengths above 290 mμ, (4) the mercury arc light filtered through a salicylic acid solution which absorbed the region from 275–325 mμ. The interesting discovery was then made that preparations of 50% converted ergosterol made by aid of the various light sources could scarcely be distinguished one from another. Yet there was a great difference in the optical rotatory power and in this way it was determined that the longer the wave-length of ultraviolet light used the stronger the positive rotation. However, no product could be got out in a well-crystalline state.

While this work was going on in the laboratory of Windaus, an article was published by Reerink and van Wyk in which it was claimed that with ultraviolet light of greater wave-length than 275 mμ a very simple photo-chemical reaction occurred with formation of a product about 60% converted, yielding a nearly pure vitamin which could be obtained in crystalline condition but had a melting point below 0° C. Use of shorter wave-lengths of light they said led to a more complicated photo-chemical reaction. Testing out these results in Windaus' laboratory, certain preparations were obtained with an antirachitic protective dose of about the same order as those of previously studied preparations obtained by irradiation with various light sources but no preparations had as homogeneous activity as preparations such as those studied by Reerink and van Wyk should have shown.

At that time the use of filter irradiation for photo-chemical conversion of ergosterol to vitamin D by others aroused lively interest (Steenbock; Rosenheim and Webster; Bills). In 1928 the observation had been made that large doses of ergosterol are toxic and that this toxic action, besides loss of weight, also was manifested by calcification in various organs (Kreitmann; Klein; Smith and Elvolve; and others). A controversy arose on whether or not the therapeutic and the toxic action originated from one and the same factor or from two different factors occurring side by side in the irradiation products. Later, Heuber and also Schuenert and Schielen found that the two activities were fully parallel in commercial preparations and hence no ground could be seen for the view that the two effects were ascribed to different factors. Meanwhile Reiter (1929) and Kisch and Reiter (1930) reported that if ergosterol is irradiated with light of greater wave-length than 280 mμ a highly active antirachitic preparation results, which in contrast to the preparations made with unfiltered light, displayed no toxic action. These results, which awakened great interest, were tested by Windaus who could not confirm them. The question remained unanswered as to whether or not the antirachitic and toxic action arose from one and the same or from two different chemical individuals. Windaus next found, and his colleagues confirmed the fact a little later, that irradiation products which were treated with sodium and alcohol or which were heated to 200°, no longer possessed antirachitic activity but did show the toxic effect. If both activities were to be ascribed to one and the same substance, it must be concluded that by chemical reaction this substance could lose one activity without loss of the other. If two different factors were at the basis of the two different effects, the antirachitic substance was definitely less stable than the toxic one. Solution of the question would only be possible if one could succeed in separating the two factors from one another without losing the activity of either.

Attempts to separate the two factors were then begun in Windaus' laboratory and they used maleic acid anhydride and citraconic acid anhydride which the studies of Diels and Alder had shown can be added to conjugate double bonds. These reagents had already been used by Windaus in his experiments for determining the position of the double bonds in ergosterol derivatives and he had worked out a method for quantitative differentiation of various ergosterol isomers. With the action of maleic anhydride on the irradiation products of ergosterol the following results were obtained: The preparation, which has been 60% converted by irradiation with the unfiltered magnesium spark, reacted comparatively rapidly with maleic anhydride and gave a high yield of the compound with it. The product obtained with the aid of xylol-filtered magnesium spark light reacted more slowly and less fully. The preparation made with unfiltered mercury arc light likewise reacted weaker than the magnesium light preparations. The preparation made by irradiation with light filtered through the double uviol glass filter reacted with the reagent the slowest and least. It should be noted that this light was of the longest wave-lengths of those employed. Now they found that the fractions of the irradiated preparations which did not react with maleic anhydride had very constant physical properties. Thus, these fractions somewhat absorbed the spectrum in the short wave region and the optical rotation had become

positive. The antirachitic potency and also the toxic action were of full normal value and no separation of the two factors had been brought about in this way. But it was of special importance that these preparations on standing in petroleum-ether solution *gradually crystallized nearly completely.* Later they found that even preparations which had not been treated with maleic or citraconic anhydride could be brought to crystallize by seeding them with crystals obtained in the above manner. The treatment with one or the other of the anhydrides has shown itself, however, to be the best technique yet found for preparing crystalline vitamin D_1. The designation D_1 is on account of the probability that many bodies present in irradiated ergosterol possess antirachitic activity.

The following example shows how the preparation of crystalline vitamin D_1 was conducted: Eight grams of ergosterol were dissolved in 270 cc. of absolute ether and irradiated in a quartz vessel by mercury arc light for nine hours. The conversion of ergosterol amounted to 59%. The irradiation products freed from ergosterol showed the specific rotation +26.8°. 3.4 grams of the irradiation product were let stand in ether solution for ten days at room temperature with 3 Gm. of citraconic anhydride. After this the material was separated into a neutral and acid fraction. 55% of the irradiation product had bound citraconic anhydride. The neutral part (1.58 Gm.) crystallized almost completely. By recrystallization from acetone 0.61 Gm. of pure vitamin D_1 was obtained as long, well-formed needles of melting point 124–125°. In a high vacuum this distills with decomposition at 135°; on heating to 180° it decomposes. The optical rotation (Na light) was +140.5° in acetone and alcohol. Vitamin D_1 combines faster with maleic anhydride than with citraconic anhydride. The reactions indicate that a system of conjugate double bonds exist in the molecule. By analysis and determination of molecular weight vitamin D_1 was shown to be an isomer of ergosterol.

Of great interest is the physiological behavior of vitamin D_1. It is worthy of note that the antirachitic activity of the crystalline D_1 is about three times weaker (dose 0.03γ) than that reported by Reerink and van Wyk for their preparation. The relationship of antirachitic and toxic effect remains the same as in non-crystalline preparations. Windaus considers that to be evidence that the antirachitic vitamin itself is the cause of the toxic effect.

Bourdillon's "Calciferol" is like Windaus' D_1 in properties except that it has far higher rotatory power. Windaus thinks it is a mixture.[1]

O. Linsert (a pupil of Windaus) of the I. G. laboratories in Elberfeld has reported (after Windaus' description of vitamin D_1 went to press) isolation of a vitamin D_2 from the irradiation products of ergosterol. D_2 vitamin melts at 114–115° [later given 115–116°] and has a specific rotation of +85° [later +82.6°]. It is more antirachitic than D_1 and displays the usual toxic effect. [0.02 and 0.015γ doses were protective.]

Further Developments —Some of the above can now be obtained in English from Windaus' own hand in *Proc. Roy. Soc.*, London, 108B (1931), 568–575. Windaus has since shown that vitamin D_2 is a component of D_1 which latter consists of a monomolecular addition compound of D_2 with an isomeric physiologically inactive alcohol, *lumisterin*. When molecular equivalents of lumisterin and vitamin D_2 are mixed, the addition compound has the physical constants of vitamin D_1. The D_1 melting point, 124°, is higher than those of the components. Lumisterin is nontoxic as well as non-antirachitic. Lumisterin melts at 118° and has a specific rotation of +191° in acetone. On irradiation with unfiltered magnesium spark light it is converted to Vitamin D_2. It appears to be an intermediate product on the way from ergosterol to Vitamin D_2 which latter may thus be looked upon as the true pure vitamin D. (*Ann.*, 492 (1932), 226; 493 (1932), 259.)

[1] *Translator's Note:* Bourdillon and co-workers first described in 1930 separation by distillation at 145° C. in high vacuum of a crystalline highly antirachitic substance melting after recrystallization from alcohol at 113–115°. In 1931 they named as *Calciferol* a product so obtained, melting at 123–125° with specific rotation of +260° in alcohol (5641 line). Later, that year, they showed that the calciferol previously described consisted to the extent of 30–50% of an inactive *Pyrocalciferol* and that pure calciferol resembled vitamin D_2 rather than D_1. Pure calciferol is described (1932) as possessing twice the antirachitic potency previously recorded for calciferol and to be of m. p. 114.5–117° with a specific rotation of +102.5° in alcohol (Na light). The purified product is obtained by removal of unchanged ergosterol with digitonin, treatment with 3,5-dinitrobenzoyl chloride, separation of the dinitrobenzoate of calciferol and hydrolysis of the latter. It appears that the early calciferol was a mixture of the molecular addition compounds of the vitamin with lumisterin and pyrocalciferol. Thus Bourdillon's group appear to have confirmed Windaus on many points and to have discovered independent methods of isolation of the vitamin. See *Proc. Roy. Soc.*, 107B (1930), 76; 108B (1931), 340; 109B (1932), 488; *Nature*, 128 (1931), 758.

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The Department of Agriculture is directed to issue rules and regulations to carry into effect the full intent and meaning of this Act.

A STUDY OF THE CHANGE IN p_H OF THE OFFICIAL ELIXIR FERRIC PYROPHOSPHATE, QUININE AND STRYCHNINE N. F. V.*

BY H. G. DEKAY AND C. O. LEE.

Few official preparations have induced more comment and discussion, among pharmacists, than has **Elixir Ferric Pyrophosphate, Quinine and Strychnine.** It has had the attention of some of our best pharmacists but is a product yet lacking in pharmaceutical elegance and dependability. Despite the fact that this elixir has grown somwhat in disrepute as a galenical, it, or preparations similar to it, continue in use.

This preparation presents three problems to the pharmacist. *First*, it is difficult to make, *second*, it very often precipitates either in the process of making or upon standing and *third*, it almost invariably darkens in color with age especially if exposed to light. The latter two problems are perhaps the most perplexing and discouraging. Among the many causes offered in explanation of these obstacles are, the effect of light, variability of the scale salts of iron, the action of alkalies upon glass bottles and upon sugar in the preparation, the addition of too much or too little ammonium hydroxide for purposes of neutralization, oxidation of the iron salt, concentration, precipitation due to salting-out effects, etc. Many more causes for the deterioration of this elixir could be given. The trouble is not likely due to a single cause but to a combination of causes which complicate the problem.

Preliminary to this study a number of commercial samples of the elixir were exposed to light and, while there were some differences in the degree of color change, they all invariably darkened. In some samples precipitation occurred.

It is not the purpose of this paper to offer a solution to the problems one encounters in making and dispensing this elixir. It is merely a record of the change in p_H, over a period of several months, in various lots of the official preparation. An effort has been made to record the change in color but with no means of measuring color change at hand our observations are crude and approximate at best.

APPARATUS.

An L. and N. student potentiometer was used with normal calomel and quinhydrone electrode. It was set up after the manner prescribed. A saturated potassium chloride solution formed the liquid junction. The reading in millivolts was converted to p_H by means of the chart furnished with the apparatus.

PREPARATION, SAMPLING AND STORAGE OF THE ELIXIR.

The elixir for this study was prepared in amounts of one to four liters. All variations from the official directions for making are noted with each lot. Care was taken to use chemicals and other materials of good quality such as are available to any dispenser.

Each lot of the elixir was allowed to stand at least 24 hours before a p_H was taken. Readings were taken every day for a few days after which the time between readings was extended to every other day, then to every week, every other week and finally to every month or six weeks.

* Section on Practical Pharmacy and Dispensing, A. PH. A., Toronto meeting.

All lots of the preparation were bottled in clear and amber glass bottles and stored upon open shelves in diffused light at laboratory temperature. These conditions were not greatly unlike those one would find in the average prescription department.

Table I presents the p_H change of three lots of the elixir over a period of about eleven months. These lots were made according to the official directions except that 5 cc. of ammonia water, per liter, were added for purposes of neutralization whereas the directions state that it should be added until the preparation tests neutral to litmus. Half of each lot of the elixir was stored in clear glass, one-ounce stoppered bottles and one-half in amber bottles of the same kind and size. The purpose of storing the elixir in this manner was to permit a p_H reading upon a fresh, undisturbed sample each time. It was thought that this method would minimize any changes that might be caused by taking samples from bottles that had been opened and exposed to the air.

TABLE I.

Lot I.			Lot II.			Lot III.	
	Clear bottles.	Amber bottles.		Clear bottles.	Amber bottles.	Clear bottles.	Amber bottles.
Age in days	p_H	p_H	Age in days	p_H	p_H	p_H	p_H
1	4.77	4.75	3	5.03	5.03	5.06	5.06
2	4.82	4.74	5	5.08	4.94	5.09	5.10
3	4.94	4.75	11	5.01	4.99	5.11	5.07
4	4.87	4.73	16	5.11	5.05	5.11	5.10
5	4.84	4.76	24	5.20	5.00	5.12	5.04
7	4.84	4.74	28	5.23	5.08	5.24	5.15
9	4.82	4.76	36	5.24	5.02	5.23	5.17
11	4.89	4.73	46	5.18	5.05	5.30	5.16
16	4.97	4.73	51	5.18	5.04	5.30	5.15
37	5.14	4.79	57	5.27	5.12	5.35	5.13
41	5.10	4.85	64	5.34	5.12	5.32	5.17
71	5.23	4.80	69	5.34	5.11	5.30	5.18
92	5.33	4.85	78	5.33	5.15	5.38	5.18
113	5.11	4.85	92	5.36	5.14	5.32	5.21
150	5.03	4.86	115	5.27	5.08	5.33	5.17
208	5.33	4.84	173	5.32	5.13	5.62	5.19
267	5.30	4.90	232	5.38	5.13	5.61	5.23
292	5.46	4.90	257	5.52	5.24	5.57	5.17
352	5.41	4.95	317	5.49	5.33	5.78	5.22
p_H change	0.64	0.20	...	0.46	0.30	0.72	0.16

These p_H readings indicate a much greater change in these samples stored in clear glass than those in the amber glass. This shows the protection that amber glass gives to preparations affected by light. The total change in p_H in the clear glass and amber glass samples was reasonably constant.

The change in color from a bright green for the freshly prepared elixir to a dark amber at the end of our observations was very gradual. While the change in color was observable we had no way of measuring it. Like the p_H change, the color change was much less in these samples stored in amber glass containers.

Table II is a record of the p_H change of three more lots of the official elixir. Each lot was made by a student in the course in manufacturing pharmacy. The finished product was stored, one-half in clear glass bottles and one-half in amber

bottles and placed upon shelves under conditions previously described. The p_H readings were made upon samples poured from the bottles. This disturbed and exposed the preparation each time a reading was taken. It was felt, however, that this procedure closely resembled the treatment that a bottle of the elixir would be subjected to in a prescription department where the bottle is opened and poured from at various intervals.

TABLE II.

	Lot IV.		Lot V.		Lot VI.	
	Clear bottles.	Amber bottles.	Clear bottles.	Amber bottles.	Clear bottles.	Amber bottles.
Age in days	p_H	p_H	p_H	p_H	p_H	p_H
1	4.95	4.95	5.02	5.02	4.83	4.83
14	5.01	4.98	4.99	4.98	4.91	4.91
19	5.01	4.95	5.01	5.02	4.91	4.91
27	5.02	4.94	5.02	4.97	4.94	4.88
37	5.05	5.00	5.19	5.05	5.05	4.93
65	5.00	4.98	5.18	5.05	5.00	4.93
123	5.21	4.98	5.30	...	5.14	4.93
207	5.25	4.98	5.39	5.09	5.35	4.90
267	5.37	4.93	5.23	5.03	5.30	4.86
p_H change	0.42	−0.02	0.21	0.01	0.47	0.03

The p_H change of the three lots in Table II are quite comparable to those of Table I. The protection of amber glass against light effects is again clearly shown. Furthermore it would seem that light is perhaps the chief agent of disturbance upon the product. At least the technique of opening and pouring from the bottles from time to time seems not to have increased the change in p_H or color. It may be further assumed that completely filled bottles are not a necessary factor for the keeping of this preparation.

The change in color for these three lots was, as far as we could tell, about the same as noted for Table I.

Table III is a record of a further study of three lots of the official elixir. Each lot was prepared by a student of the class in manufacturing pharmacy. Care was taken to neutralize each lot with ammonia water as given in the official directions. The finished lots were then stored in clear and amber bottles as described for Lots IV, V and VI.

TABLE III.

	Lot. VII.		Lot VIII.		Lot IX.	
	Clear bottles.	Amber bottles.	Clear bottles.	Amber bottles.	Clear bottles.	Amber bottles.
Age of days	p_H	p_H	p_H	p_H	p_H	p_H
1	5.87	5.87	6.01	6.01	6.67	6.67
14	5.91	5.91	6.05	6.00	6.67	6.72
19	5.85	5.91	6.00	6.00	6.67	6.72
27	6.01	5.93	6.07	6.00	6.72	6.72
37	5.96	5.95	6.07	5.99	6.71	6.65
65	6.00	5.96	6.19	...	6.64	6.65
123	5.96	5.97	6.15	...	6.66	...
207	5.98	5.85	6.10	6.01	6.50	6.49
267	6.08	5.79	6.16	5.99	6.31	6.28
p_H change	0.21	−0.08	0.15	−0.02	−0.36	−0.39

The change in p_H in the lots found in Table III is not significant. However, the observable change in color was much greater than for Lots I to VI, for the samples stored in the amber as well as in the clear glass bottles. A study of this

table suggests two things. *First*, that careful neutralization of the finished elixir with ammonia water seems to stabilize it as to p_H but not as to color. *Second*, that change in p_H is not always an indication of the change in color. Lot IX, Table III, became more acidic upon standing. This is the most significant change in the direction of acidity that we observed.

A study of ten lots of the official elixir is shown in Table IV. These lots were made several months later than those previously described. The purpose of this study was to observe the effects of the addition of stabilizing chemicals to the finished elixir. Lot X was used as a control and no chemical was added to it. It was not even neutralized with ammonia water as the directions suggest.

To Lots XI, XII and XIII were added 3 cc., 6 cc. and 9 cc. of ammonia water per liter, respectively.

To Lots XIV, XV and XVI were added 2, 4 and 6 Gm. of sodium phosphate per liter, respectively.

To Lots XVII, XVIII and XIX were added 2, 4 and 6 Gm. of sodium citrate per liter, respectively.

Each lot was then placed in a clear glass bottle and stored as were the previous lots. Amber glass bottles for storage were omitted in this study.

The p_H was taken upon samples poured from the bottles from time to time.

The color change as observed for these lots was about the same as that of previous lots.

The p_H change of the lots in Table IV was rather regular until the last reading when a few sudden breaks appeared.

TABLE IV.

Lots Age in days	X p_H	XI p_H	XII p_H	XIII p_H	XIV p_H	XV p_H	XVI p_H	XVII p_H	XVIII p_H	XIX p_H
1	4.58	4.99	5.37	5.75	4.75	4.89	5.22	4.67	4.78	4.93
10	4.56	4.99	5.37	5.83	4.76	4.95	5.24	4.67	4.82	4.95
20	4.58	5.03	5.43	5.85	4.83	5.05	5.29	4.74	4.84	4.96
33	4.51	5.01	5.52	5.89	4.89	5.02	5.32	4.81	4.92	5.03
48	4.79	5.01	5.65	5.98	5.11	5.10	5.42	4.90	5.03	5.20
76	4.74	5.23	5.65	6.02	5.20	5.33	5.42	5.10	5.17	5.27
101	4.85	5.35	5.70	6.05	5.32	5.36	5.56	5.21	5.25	5.40
161	5.26	5.50	5.70	6.12	5.38	5.73	5.66	5.41	5.30	5.40
p_H change	0.68	0.51	0.33	0.37	0.63	0.84	0.44	0.74	0.52	0.47

DISCUSSION.

This study suggests the need for a more extended research into what actually happens to the elixir when it changes in color usually from a bright green to a dark amber and sometimes to an inky black liquid. Perhaps the preparation would not change color if completely protected from light but that would hardly be practicable. It has long been known that amber glass protects this preparation from the deteriorating effects of light but our observations indicate that amber does little more than retard the speed of change in p_H and color. It has been claimed that stability of this product is dependent upon its being about neutral. Our readings do not verify such an assumption although that would seem to be true in some cases so far as the p_H was concerned but not so with respect to permanency of color. Lot X, Table IV, maintained a relatively low p_H with about the average change in color. Lot IX, Table III, contained the larger amount of ammonia water and was therefore more nearly neutral and yet it showed a greater darkening than those in the same table which were somewhat more acid. The lots containing sodium citrate showed the formation of a gas to the extent of

blowing out the stoppers, in addition to the general change in color and p_H. According to Burt (1), who studied the effect of sunlight upon citric acid in the presence of ferric salts, the gas formed in such preparations is CO_2.

The most perplexing part of this problem is that of discoloration of the official elixir upon standing. While there may be some relation between p_H change and change in color our observations hardly warrant such an assumption.

Much has been said about this preparation ever since its introduction into medicine. While pharmacists "in the good old days" did not solve this problem, they did, at least, discuss it. In 1894, the *American Druggist* (2) commented editorially upon this preparation, as follows: "We wonder if there is anything which exercises the minds of the pharmacists more than the making of elegant elixirs (and of elixir of triple phosphates in particular). There is certainly no other subject upon which so much good pharmaceutical gray matter has been and is wasted." Edel (3) in 1896, said:

"Among modern elixirs that of iron, quinine and strychnine easily is the most popular; and I feel warranted in saying that its preparation has proved a stumbling block to many pharmacists."

A few years later Francis (4) said:

"Formulæ without number have been proposed during the past years and almost every pharmacist has from time to time been thoroughly convinced that he had solved the problem of producing this elixir containing the full measure of genuine soluble ferric phosphate which would not discolor or precipitate with age."

The reasons offered for the deterioriation of this elixir are often contradictory. For instance, Dunn (5) in commenting upon the U. S. P. elixir said:

"Do not follow the U. S. P. directions and if the solution is acid to litmus paper, neutralize exactly with ammonia water."

In the following year, Fritzinger (6) said that the U. S. P. directions should be followed and there is no objection either pharmaceutically or therapeutically to a slight acidity of the solution. One writer suggested the use of heat to get the iron salt into solution and another one said to avoid its use. Many have criticized the official process for making this elixir and offer better methods for making it. Others say positively that the official directions are all right if correctly followed.

As it seems to us the problem of change in color in this elixir upon standing will never be solved by skirmishing attacks. The composition of the preparation suggests all sorts of possible chemical and physical situations, no one of which could be the sole cause of the trouble. It would at least be interesting and perhaps worth while for some one to work upon this problem giving consideration to every possible factor that might affect the stability of the preparation. Elixir Ferric Pyrophosphate, Quinine and Strychnine has been in the official list for several decades. Since it is official and continues in wide use, as pharmacists we should understand it better than we do.

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(2) *Am. Drug.*, 24 (1894), 136.
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NOTES ON VARIATIONS IN THE WEIGHTS OF QUININE SULPHATE CAPSULES.*

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There apparently is some confusion in the methods used by various pharmaceutical manufacturers in the weight determinations of quinine sulphate capsules. Different authorities recommend different methods and there is usually no close agreement in the results expressed. In an endeavor to arrive at a more satisfactory method of determination, we have made the following observations for which no claim of completeness is made. We have used machine-filled 5-grain quinine sulphate capsules, made by leading manufacturers and purchased on the open market, for these examinations.

Several factors must be taken into consideration in devising a reasonably accurate method for determining the weights of quinine sulphate in gelatin capsules. First and foremost, as is well known, quinine sulphate is very efflorescent and loses weight in air under ordinary temperature and humidity conditions. Capsules filled with quinine sulphate from a newly opened container will lose more than 5 per cent in weight in 12 hours under similar atmospheric conditions, due entirely to loss of moisture. One hundred ounces of U. S. P. X quinine sulphate from a freshly opened container will lose ten ounces or more of moisture when exposed over night to the air. A group of ten recently filled five-grain capsules, containing no admixed starch, lost 3% in weight in three hours on the laboratory table and when allowed to remain undisturbed over night, the total loss of weight was 6.38%. It can readily be seen that this may lead to serious difficulties when the capsules are officially investigated. The required amount of quinine sulphate is present but, due to loss of moisture, the net weight is low.

This source of trouble can be eliminated by the addition of starch to the air-dried quinine sulphate crystals. The mixture being in fairly good equilibrium with the humidity, little change in weight occurs.

The gelatin shells, if used as counterpoises in assaying the finished product, are also a great source of error; in fact, they are probably the source of greatest error. These empty capsules change weight quite rapidly as the humidity varies, taking up and giving off moisture; this will account for a small error.

The weight per empty shell varies greatly from the average weight of a number of them; the lightest and the heaviest shells in a large group weighed individually, varied 13.6% from the average weight (1.54 grains each) of that group. It is our understanding that this particular variation in weight is unavoidable in the manufacturing process. This comparatively great variation in weights militates against using a single capsule at any time as a counterpoise in arriving at the correct figure for the net weight of any one capsule.

One of the largest manufacturers of quinine sulphate capsules determines the weight of his product by carefully emptying the contents of each capsule on to the pan of an analytical balance and thus arrives at the net weight of the contents.[1] This, of course, would be an ideal method, and is undoubtedly quite accurate, but it has been our experience that it is somewhat difficult to absolutely empty, com-

* Section on Practical Pharmacy and Dispensing, A. PH. A., Toronto meeting, 1932.

[1] Private communication.

pletely, the contents of the capsule. Quite frequently an appreciable quantity of the sulphate remains clinging to the interior surfaces of the capsules, in spite of efforts made to remove all of it. The error from this source may be quite large.

An additional failing of this method is the fact that comparatively few capsules from a large lot are actually weighed; too long a time is required to completely empty a hundred or more capsules and weigh the contents.

One authority weighs each capsule individually, using a single empty shell as a counterpoise. We have found that while this method usually gives results which closely approximate those obtained by the method recommended in this article, there are, nevertheless, variations. We believe these differences to be due to the variations in weights of the empty shells used as counterbalances, which have previously been described. As an example of this, one capsule weighed 5.11 grains net with a certain empty shell, while the same capsule weighed 4.97 grains with another empty shell of the same lot. This is a variation of nearly 3% due entirely to the counterpoise weight.

Of course, for accuracy and for a real "umpire method" the weights may be determined in the usual way, by shaking out the quinine with chloroform; this, however, requires time, and is to be avoided when possible.

During the course of these brief experiments there were noted several rather large variations in the actual sulphate content in a single lot of capsules. For instance, in a lot produced by one of the largest manufacturers, one capsule had a net sulphate weight of 84.4% of standard, and another from the same bottle weighed 124.2%; this is the weight of quinine sulphate alone. These are, of course machine-filled with a quinine sulphate-starch mixture.

As a result of the observations noted, we submit the following scheme for determining the weight of quinine sulphate capsules. This method has been in use in this laboratory for several years and has been found, we believe, to be not only quite accurate, but also reasonably rapid. It has the advantages of the use of many capsules from the large lot being determined and also the use of many empty shells as counterpoises, in order to average the weights of both. The method we propose is to sample as accurately as possible the entire lot of capsules, being very careful to obtain an average sample. The lot may be sampled by the "quartering" method, by passing the whole lot repeatedly through a sampler or in any other suitable way. These capsules are weighed in the laboratory on the balance in groups of 20 against a counterpoise of 20 new empty shells from the same lot as that from which the filled capsules were made, until 200 capsules have been weighed. The 20 empty counterpoise shells are changed completely three times during the weighing of the 200 capsules—to eliminate, as far as possible, the errors caused by abnormal shells. The average weight reported for the entire lot is the figure obtained by averaging these 10 weighings.

CONCLUSION.

We believe this to be as accurate and satisfactory a method for weighing large lots of quinine sulphate capsules as any we have so far studied.

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A STUDY OF VEHICLES FOR MEDICINES.*

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1. THE ERIODICTYON PREPARATIONS.

Eriodictyon preparations are, at the present, chiefly used as disguising vehicles for bitter remedies, such as quinine; for which purpose they were first recommended by Rother (1) who believed that this disguising value depended upon the formation of insoluble quinine resin salts from which the quinine could be readily assimilated.

From an historic standpoint it is of interest that the Indians of California and Mexico employed this resinous evergreen plant, in the form of infusion or decoction in whisky, as a remedy for consumption, so that it came to be known as "Consumptives' Weed." The "electic" physician, J. H. Bundy (2), who in 1875 introduced eriodictyon to medical notice, also ascribed to it expectorant value in "chronic lung cases," though none in acute coughs and colds. The fact that no such use is made of this drug, at the present time, suggests that it has no particular value for these purposes: for a remedy whose clinical value can be definitely demonstrated is not likely to be abandoned.

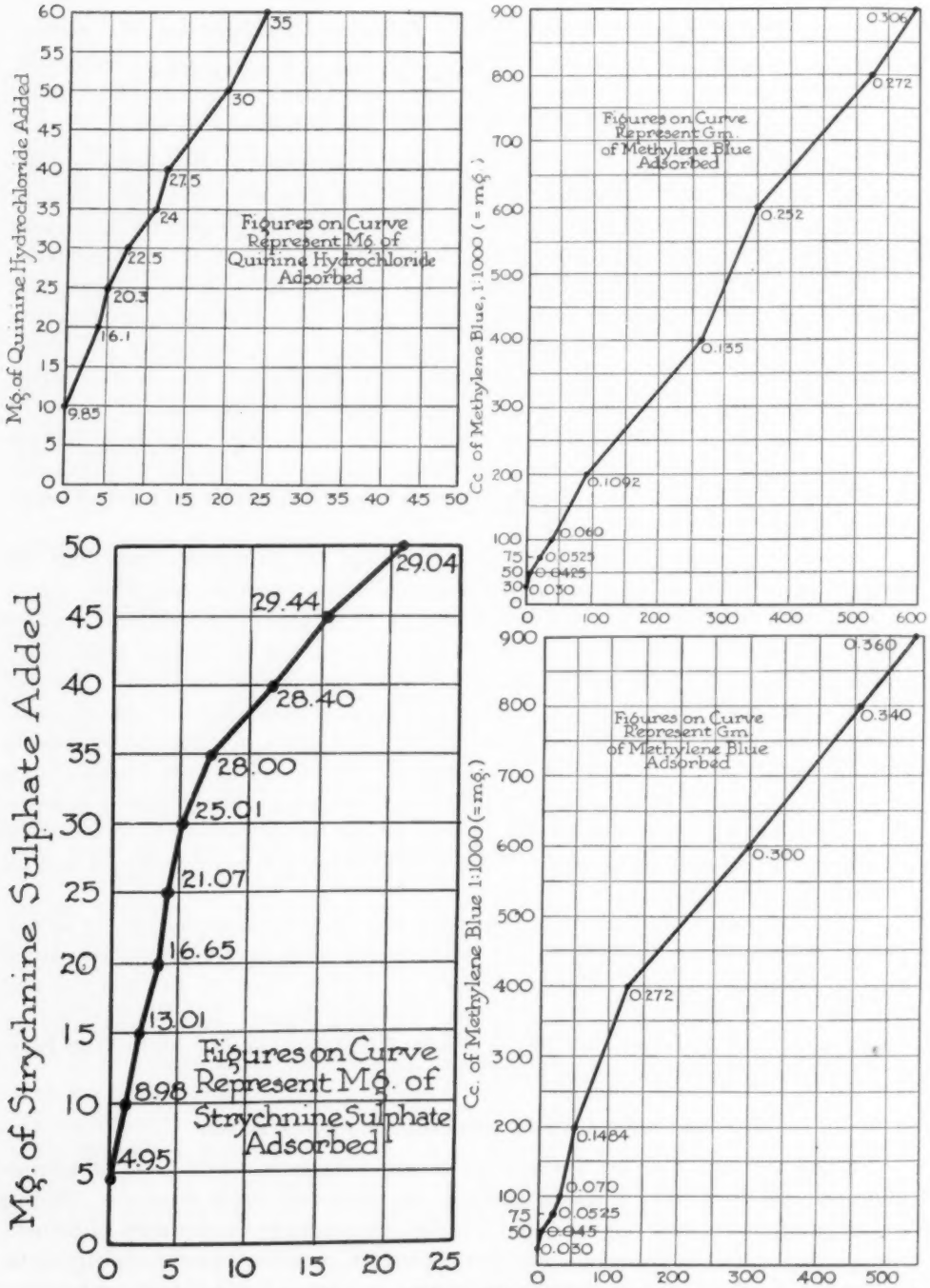
As we were unable to discover, from a study of the literature, excepting for Rother's suggestion, as to what ingredient eriodictyon owed its disguising value, we proceeded to separate the known proximate principles of eriodictyon; and to study their quinine disguising action. Thus, we isolated eriodictyol and homo-eriodictyol, both of which were separated by us in pure crystalline form. Eriodictyol, of which the fluidextract yields about 0.23%, was obtained in the form of small, fawn-colored plates. It is soluble in hot alcohol and acetic acid, sparingly soluble in boiling water and most other organic solvents. Homo-eriodictyol is present in a larger amount (about 3%) and crystallized in glistening leaf-shaped masses possessing a silky luster. It is less soluble in water than eriodictyol and more readily soluble in alcohol and acetic acid. Both eriodictyol and homo-eriodictyol had no obvious effect in the disguising of quinine.

That the resins of eriodictyon constitute the "active principle," as far as disguising of quinine is concerned, has become evident to us from experiments, which will be presented in the following order: 1. Fluidextract of Eriodictyon and Quinine. 2. Fluidextract of Eriodictyon and Strychnine. 3. Fluidextract of Eriodictyon and Codeine. 4. Fluidextract of Eriodictyon and Methylene Blue. 5. Resinoid of Eriodictyon and Methylene Blue.

FLUIDEXTRACT OF ERIODICTYON AND QUININE.

When we add 1 cc. of fluidextract of eriodictyon to 0.040 Gm. of quinine hydrochloride in 1:1000 aqueous solution, the after-bitterness otherwise clinging to the palate is entirely removed and a reduction occurs in the primary bitterness, though this is not lost entirely. As a matter of fact, eriodictyon has a slightly bitter taste of its own. If the proportion of quinine is increased, the bitterness becomes quite marked and lasts for a considerable time afterward. Hence, as far as tasting experiments are concerned, 0.040 Gm. seems to be the limit of the disguising

* From the Laboratory of Pharmacology of the College of Medicine of the University of Illinois, and assisted by a Research grant from the AMERICAN PHARMACEUTICAL ASSOCIATION.



Upper, left.—Curve 1: One cc. Fldext. Eriodictyon added to varying quantities of Quinine hydrochloride in 49 cc. of water. Lower, left—Curve 2: One cc. to varying quantities of Strychnine sulphate in 49 cc. of water. Upper, right.—Curve 3: One cc. Fldext. Eriodictyon added to varying quantities Methylene Blue in 1:1000 aqueous solution. Lower, right.—Curve 4: Eriodictyon resinoid (0.33 Gm. in 5 cc. alcoholic menstruum) added to varying quantities of Methylene Blue in 1:1000 aqueous solution.

power of 1 cc. of fluidextract of eriodictyon; and this agrees with Sollman's (3) findings, and also fairly well with the following quantitative experiments.

Method of Study.—We added 1 cc. of fluidextract of eriodictyon to progressively increasing quantities of quinine hydrochloride, always made up to 50 cc. with distilled water. The mixture was well shaken and filtered. Then 25 cc. of the filtrate was tested for the amount of quinine left in solution in the following manner: it was made strongly alkaline with Ammonia T.S. and extracted with ether-chloroform (3:1) mixture, as directed in the U. S. P. Assay of Cinchona. The alkaloidal solution was evaporated to dryness and the quinine taken up in 25 cc. of acidified water. An aliquot portion of this filtrate was then diluted with water to a definite volume estimated to make it correspond in strength, as nearly as possible, with one of the following standards.

0.0010 Gm. Quinine hydrochloride in 100 cc. of water
0.0015 Gm. Quinine hydrochloride in 100 cc. of water
0.0020 Gm. Quinine hydrochloride in 100 cc. of water
0.0025 Gm. Quinine hydrochloride in 100 cc. of water
0.0030 Gm. Quinine hydrochloride in 100 cc. of water

For each 5 cc. of solution and of standard we used 1 cc. of an arseno-molybdate solution of the following composition, as recommended by E. J. Sterkin and J. I. Helfgat (4):

Equal portions of
0.12% solution of sodium arsenic acid,
2.00% ammonium molybdate solution,
2.00% hydrochloric acid.

The results obtained with the arseno-molybdate solution were checked with Mayer's Reagent from which practically the same results were obtained, excepting that the latter method is not as sensitive to small amounts of alkaloid. When using Mayer's Reagent, however, extraction with the ether-chloroform mixture was not necessary, the reagent being added directly to the filtrate in the following manner:

Exactly 3 cc. of the diluted filtrate and the same amount of comparable standard are treated alike, side by side, with 3 drops of diluted sulphuric acid and 0.5 cc. of Mayer's Reagent, and the amount of quinine present determined by comparing the density of the precipitates.

The results obtained also checked with a modified U. S. P. method, as directed for the determination of alkaloids.

When we add 1 cc. of fluidextract of eriodictyon to increasing quantities of quinine hydrochloride in 1:1000 solution, remove the precipitate by filtration, and test the filtrate as above described we obtain the following figures (Table I) which, when plotted, yield Curve 1.

TABLE I.—ONE CC. OF FLUIDEXTRACT OF ERIODICTYON ADDED TO VARYING QUANTITIES OF QUININE HYDROCHLORIDE.

Quinine Hydrochloride in Solution, Gm.	Quinine in Filtrate, Gm.	Quinine Adsorbed, Gm.
0.010	0.00015	0.00985
0.020	0.0039	0.0161
0.025	0.0047	0.0203
0.030	0.0075	0.0225
0.035	0.0110	0.0240
0.040	0.0125	0.0275
0.050	0.0200	0.0300
0.060	0.0250	0.0350

We may conclude, therefore, that quinine is not removed completely from solutions by means of eriodictyon; that, however, nearly all of it is removed, if the quantity is less than 10 mg. per 1 cc. of fluidextract; and that the quantity taken out of solution increases progressively with the increase in the quantity of quinine offered.

FLUIDEXTRACT OF ERIODICTYON AND STRYCHNINE.

When we add, to varying quantities of strychnine sulphate in 49 cc. of water, 1 cc. of fluidextract of eriodictyon, we obtain a filtrate that is practically tasteless and almost devoid of alkaloid, providing the quantity of the strychnine salt does not exceed 5 mg.: 4.95 mg. of strychnine sulphate having been removed from solution. With increasing quantities of strychnine sulphate added to the same amount of the fluidextract, we find that progressively larger quantities are removed from solution, but that larger quantities also remain as shown in Table II and Curve 2.

The strychnine determinations were made in the following manner:

We added to varying amounts of strychnine sulphate, in 49 cc. of water, 1 cc. of fluidextract of eriodictyon. We employed 25 cc. of the filtrate, made it alkaline with ammonia water and extracted with chloroform. After evaporation of the chloroform, the strychnine was taken up with a definite amount of $N/50$ sulphuric acid, and the excess of acid was titrated with $N/50$ sodium hydroxide, using methyl red as indicator; and strychnine was calculated as strychnine sulphate.

Strychnine sulphate, in quantities of 30, 40 and 50 mg., was also determined gravimetrically as a check to the above method by extracting the strychnine in the filtrate by immiscible solvents, evaporating the solvent, weighing as strychnine and calculating the sulphate.

TABLE II.—ONE CC. OF FLUIDEXTRACT OF ERIODICTYON ADDED TO VARYING QUANTITIES OF STRYCHNINE SULPHATE.

Strychnine Sulphate in Solution, Gm.	Strychnine in Filtrate, Gm.	Strychnine Adsorbed, Gm.
0.005	0.00005	0.00495
0.010	0.00102	0.00898
0.015	0.00199	0.01301
0.020	0.00335	0.01665
0.025	0.00393	0.02107
0.030	0.00490	0.02510
0.035	0.00700	0.02800
0.040	0.01168	0.02832
0.045	0.01556	0.02944
0.050	0.02100	0.02900

FLUIDEXTRACT OF ERIODICTYON AND CODEINE.

Having found that 10 mg. of quinine hydrochloride and 5 mg. of strychnine sulphate are removed from solution by 1 cc. of fluidextract of eriodictyon to a sufficient extent to make these proportions of value in disguising, codeine phosphate was experimented with as probably the third most important alkaloid; though, as far as the "extent of use investigation" is concerned, codeine actually ranks first. A few preliminary tests, which will have to suffice here, make it evident that codeine obeys the same law as the other alkaloids tested: 10 mg. of codeine phosphate being completely removed from solution, at least as far as the addition of Mayer's Reagent to the acidified filtrate would indicate. On addition of 20 mg. of codeine phosphate to 1 cc. of the fluidextract, a definite precipitate is produced in the filtrate by Mayer's Reagent.

We may conclude, therefore, that 1 cc. of fluidextract of eriodictyon is capable of disguising about

10 mg. of quinine hydrochloride
5 mg. of strychnine sulphate
10 mg. of codeine phosphate.

FLUIDEXTRACT OF ERIODICTYON AND METHYLENE BLUE.

To further acquaint ourselves with the nature of the reaction between organic bases and the fluidextract of eriodictyon, we conducted dye experiments, as the quantitative determination of alkaloids is relatively time consuming. The justification for this procedure, we believe, is furnished by the results obtained.

We added 1 cc. of fluidextract of eriodictyon to each of progressively increasing quantities of methylene blue in 1:1000 solution, and estimated colorimetrically the amount of methylene blue that passed through in the filtrate. Up to 0.030 Gm. per 1 cc. of fluidextract of eriodictyon, the methylene blue is almost completely removed from solution. Above this point, progressively larger quantities appear in the filtrate, although the power of holding the dye increases with increase in the quantity of dye offered, as shown in Table III and plotted in Curve 3.

TABLE III.—ONE CC. OF FLUIDEXTRACT OF ERIODICTYON ADDED TO VARYING QUANTITIES OF METHYLENE BLUE IN 1:1000 AQUEOUS SOLUTION.

Methylene Blue in Solution, Gm.	Methylene Blue in Filtrate, Gm.	Methylene Blue Adsorbed, Gm.
0.030	Too light to read	0.0300 (almost)
0.050	0.0075	0.0425
0.075	0.0225	0.0525
0.100	0.0400	0.0600
0.200	0.0908	0.1092
0.400	0.2650	0.1350
0.600	0.3480	0.2520
0.800	0.5280	0.2720
0.900	0.5400	0.3060

That we have to deal here with a case of adsorption rather than of chemical union, may be concluded from the fact that the removal of the base from the solution is not complete in any proportion and that, within limits, the quantity removed from solution increases with increasing quantity of dye. We also found that slight modifications in technic produce unproportionately great changes in the results. That we have to deal here with a very loose combination of base and eriodictyon principles, is shown by the fact that the dye or the alkaloid, as the case may be, is readily dissolved out by $N/20$ hydrochloric acid, leaving a resinous material behind. The precipitate is also easily dissolved by alcohol, as well as by very dilute alkali ($N/100$, even $N/1000$). This makes it very evident that the alkaloidal compound will be broken up by the digestive juices, liberating the alkaloid for absorption into the blood.

THE "ACTIVE PRINCIPLE" OF ERIODICTYON.

That the "resinoid" is the active agent is shown by the fact that practically the same degree of activity resides in the resinoid, which may be obtained by adding

the fluidextract of eriodictyon to an excess of water, collecting the precipitate on filter paper, washing and drying. The yield is 0.33 Gm. per 1 cc. of the fluidextract. This resinoid redissolved in the menstruum (alcohol, 4 volumes, and water, 1 volume) is as efficient in removing methylene blue from solution as the equivalent amount of fluidextract, as shown by Table IV and Curve 4. To obtain such results, however, we must use a more dilute solution of the resinoid in order to secure as efficient, evidently as colloidal, a precipitate as is yielded by the undiluted fluidextract. Presumably some of the other ingredients in the fluidextract favor colloidal dispersion of the resinoid from the more concentrated solution. It is only when there is a great excess of resinoid, about ten times the weight, that it removes the dyé almost completely from solution. It adsorbs more dye with the increase in the amount of dye; leaving, however, a larger quantity of unadsorbed dye in solution.

TABLE IV.—ONE CC. OF A SOLUTION OF 0.330 GM. OF RESINOID IN 5 CC. OF ALCOHOLIC MENSTRUUM IS ADDED TO VARYING QUANTITIES OF METHYLENE BLUE IN 1:1000 AQUEOUS SOLUTION.

Methylene Blue in Solution, Gm.	Methylene Blue in Filtrate, Gm.	Methylene Blue Adsorbed, Gm.
0.030	Too light to read	0.0300 (almost)
0.050	0.005	0.045
0.075	0.0225	0.0525
0.100	0.030	0.070
0.200	0.0516	0.1484
0.400	0.128	0.272
0.600	0.300	0.300
0.800	0.380	0.320
0.900	0.540	0.360

That this adsorption is based on electric charges—the resinoid being electronegative and attracting the electro-positive base—is shown by the fact that an acidic dye like eosin is not removed in any appreciable amount from solution by the fluidextract of eriodictyon; nor does eriodictyon seem to lessen the taste of such acidic body as phenobarbital. This specific adsorption relation also explains why the other taste sensations, that of sour, salty or sweet are not diminished by eriodictyon; and it is evident that *only the bitter taste of bases is disguised by it.*

That the resinoid is *the* active principle in the disguising of quinine is also shown by the negativeness in this respect of the other two proximate principles of eriodictyon studied, as reported above.

THE AROMATIC SYRUP OF ERIODICTYON.

The aromatic syrup of eriodictyon is a relatively popular preparation, as is shown by its scoring a usage of 11 per 10,000 prescriptions in the "U. S. P.-N. F. Prescription Ingredient Survey" completed by Professor E. N. Gathercoal. This is equivalent to an annual usage in prescriptions in the United States of 275,000 to 300,000 times.

Our study of the syrup indicates that it richly deserves this popularity: That, indeed, it is probably not as popular as it ought to be. It is interesting to note that the percentage of alkali (0.125%) contained in it is barely sufficient to maintain the resin in solution; and that it is quite fortunate the amount is not larger for we have found that a doubling of the percentage of alkali would be sufficient to dissociate the quinine adsorption product, thereby destroying the utility of the syrup for the disguising of the alkaloid.

In view of the fact that the syrup contains a relatively small amount of eriodictyon, 10 cc. of syrup being equivalent to 0.32 cc. of the fluidextract, one might anticipate a relatively restricted disguising power for quinine. If 1 cc. of the fluidextract disguises 0.040 Gm. of quinine hydrochloride, then 10 cc. or about two teaspoonfuls of the syrup might be expected to disguise only 0.013 Gm. of quinine hydrochloride, which is indeed the case. This, however, is so very minute a dose, as to be of no practical importance.

When we increase the amount of quinine in the form of hydrochloride, an offensive bitterness appears; and the precipitate, being very light, separates and rises to the top. It is possible to disguise a much larger amount of quinine in form of the alkaloid. In this case, too, the precipitate is light and rises to the top. It is a curious fact that the precipitate formed by the addition of quinine sulphate is, in contradistinction to the others, heavier; and has but a slight tendency to separate. It is also possible to introduce considerably more—as much as 0.050 Gm. of quinine sulphate per 5 cc. of the syrup—without the development of more than a moderate degree of bitterness. In other words, quinine sulphate gives the best mixture with syrup of eriodictyon: a mixture that stands up better than either of the two other forms of quinine experimented with; and the bitterness of the preparation is not any greater than that resulting from the use of quinine alkaloid. However, with a 1% suspension of quinine sulphate the practical limit of the disguising power of this syrup is reached.

As this is still rather too small a dose of quinine for the treatment of malaria, we experimented with quinine ethyl carbonate (euquinine) and diquinine carbonate (aristochin); and find that it is possible to suspend as much as 0.30 Gm. of either of these per teaspoonful of the syrup with the production of an actually delicious dose, with but a slight tinge of immediate bitterness and no after-bitterness whatever. We, therefore, recommend the following prescription as the best disguised liquid administration form of quinine known to us.

℞	Quinine ethyl carbonate	5.00 Gm.
	Aromatic syrup of eriodictyon, to make	60.00 cc.
	M. Label: Teaspoonful every four hours.	

This preparation is much more palatable than cacao syrup-quinine preparation, which, though quite free from immediate bitterness, leaves a long lingering bitter taste behind.

In attempts at improving or simplifying the manufacture of the syrup, we have prepared it with various modifications: using various proportions of alkali, compound spirit of cardamom, as well as compound spirit of orange; but have failed to secure any improvement by these means upon the official formula.

In the disguising of codeine, the syrup is also of practical value, at least for children's dosage. Thus, the following prescription is deliciously sweet, with but a slight tang of initial bitterness, and no after-bitterness whatever.

℞	Codeine phosphate	0.10 Gm.
	Aromatic syrup of eriodictyon, to make	60.00 cc.
	M. Label: Teaspoonful with water every two to four hours as required.	

In the disguising of strychnine, the aromatic syrup of eriodictyon is still more

efficient, because the therapeutic dose of strychnine is so much smaller. While an adult dose of 1 to 2 mg. overtaxes its disguising power, a dose of $^1/_4$ to $^1/_2$ mg. is well covered.

℞	Strychnine sulphate	0.015 Gm.
	Aromatic syrup of eriodictyon, to make	120.00 cc.

M. Label: Teaspoonful in water three times a day after meals.

It will be found that the dose of strychnine as well as of quinine that is present in the Elixir Iron, Quinine and Strychnine could be much more pleasantly administered with the Aromatic Syrup of Eriodictyon, instead of Aromatic Elixir as the vehicle. Unfortunately, iron cannot be added to this mixture, owing to "ink" formation, due to combination obviously with the tannic acid present. Attempts at detannating the eriodictyon have thus far not been successful.

There is no doubt that other alkaloids can be disguised in a similar manner; and we hope to pursue this question at a future time.

INCOMPATIBILITIES.

It must be realized that the syrup of eriodictyon is a very delicately adjusted preparation, and that it is—and must be—slightly alkaline in reaction. It is, therefore, incompatible with acids and acid salts. It is also incompatible with alkalies, as an excess of alkali dissociates the alkaloid-resin compound. Iron salts constitute another important incompatibility. Oxidizing and reducing agents are, of course, also taboo.

AROMATIC ELIXIR OF ERIODICTYON.

The aromatic elixir of eriodictyon is hardly prescribed at all. This is not to be wondered at when we contemplate the fact that the elixir, as at present constituted, is a very unstable preparation: becoming cloudy soon after its preparation and having a tendency to progressive precipitation upon standing. It also offers a curious example of pharmaceutic redundancy, containing no less than fifteen ingredients. As it should be a fundamental principle of medicinal combination that each ingredient must have a reason for its presence in the formula, we may cogently ask, why the fluidextract of taraxacum, admittedly a bitter drug, is contained in a preparation, the accepted purpose of which it is to serve for the disguising of the bitter taste? Also, why should glycyrrhiza be used in its preparation, when this is largely precipitated out by the alcoholic menstruum. And yet the menstruum is not sufficiently alcoholic to keep the resinoid, the active principle of eriodictyon, in solution: so that an undetermined quantity is unceremoniously filtered out and some of it continually separates on standing, as previously noted. For all these reasons we believe that the aromatic elixir of eriodictyon should be deleted from the National Formulary.

CONCLUSIONS.

1. The "active principle" of eriodictyon, as far as the disguising of quinine, codeine or strychnine is concerned, is the resin.

2. The resin acts by a process of adsorption, which is specific for bases only, as is evidenced by positive results with alkaloids and basic dyes and negative results with acids and with an acidic bitter substance, such as phenobarbital.

3. Only the bitter taste of basic bodies, given in very small doses (*e. g.*, strychnine) or of slight bitterness (*e. g.*, quinine ethyl carbonate) can be satisfactorily disguised by eriodictyon.

4. The aromatic syrup of eriodictyon is an elegant preparation, for which we cannot suggest any improvement.

5. The aromatic elixir of eriodictyon, on the other hand, is a very unstable and unsatisfactory preparation; and, as it is hardly prescribed at all, we recommend its deletion from the National Formulary.

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PEYOTE—THE DIVINE PLANT OF CERTAIN INDIAN TRIBES.*

BY JOHN THOMAS LLOYD.

Peyote or Mescal Buttons, known also by a number of other names, in the words of Louis Lewin—"towers above the rest of known plants on account of its special effects on man. No other plant brings about such marvelous functional modifications of the brain."

Peyote is a species of cactus (Anhalonium lewinii). When fresh the top is fleshy, gray-green in color, and dome-shaped, usually about an inch and a half in diameter. The root is long and tapered, resembling the root of a parsnip. For use, the tops are removed and dried. In this condition they are brown and greatly shrunken.

The plant occurs locally over a considerable part of the Mexican Plateau, and extends north of the Rio Grande, into Texas.

Accounts of the influence of Peyote on the human mind have appeared in a few publications. These agree in their descriptions of the pleasing brilliancy of color and the fantastic forms of objects seen under the effect of the drug.

By the Indians, the plant has been known for untold generations, and worshipped as the "vegetable incarnation of the Divinity." It is known not alone to the Indians of the regions it inhabits, but also to tribes as far West as the Pacific, and northward to Wyoming and Nebraska, while Indians from Oklahoma make annual pilgrimages to Texas to gather their supply for worship. Naturally, the use of Peyote was condemned and forbidden by the early missionaries, while later it attracted the attention of officials concerned with Indian affairs, under whose influence a prohibitory law was enacted against the use of the drug. This law is apparently as effective as other laws designed to change religion, or modify established customs.

The present article is written to record visions and hallucinations experienced by the writer while in the region of Mexico in which Peyote grows, and among the Indians who use it. These hallucinations, following an Indian dance around a fire, as is customary in the Peyote ceremony, were so fantastic and vivid that he

* Section on Historical Pharmacy, A. PH. A., Toronto meeting, 1933.

now feels little doubt that he was under the influence of the drug. They were so profound that twenty-eight years have failed to dim them in memory. Many times he has attempted to describe them, much as they are related in the following paragraphs, but always with the realization that his words could never describe the inspired creations of his brain.

The town of Los Peños, in all probability, is not shown on your map. Were it not that its few thatched shacks are the only habitations on a long stretch of the arid, rocky coast of Western Mexico, it would scarcely claim a name. Yet, for almost thirty years, the writer's memory has retained a clear picture of that little group of thatched houses on the slope of a mountain rising from the sea, while memories of important places and events of recent years, have blurred or faded.

It was at Los Peños, one late February morning in 1904, that an Indian and I grounded a dug-out canoe, and stretched our cramped limbs. For two days and nights, while the ever-thickening sky signaled the on-coming of the stormy season, we had sailed and paddled our hollow log, more than a hundred miles through open ocean, in conflict with the efforts of strong currents to sweep us around Cabo Corrientes (Cape Current), and past our destination.

At Los Peños, the services of Juan Estrello, a tall, athletic Indian, were engaged as muleteer, to take me and my few belongings to the railway, at Guadalajara. The luggage was packed on a mule, while I rode a pony, and Juan walked. At the start Juan wore muslin trousers, fitting tightly at the waist and flaring at the bottoms, while his muslin shirt tails hung loosely outside his belt. Away from the town, his shirt was discarded, and his baggy trousers rolled until he was covered by scarcely more than a breech-cloth. From the beginning, he was impatient to reach a certain place as soon as possible. I could make out only that there was to be dancing and gaiety, nor did I ever learn with absolute certainty the cause of the festivities.

The way from Los Peños to the upland was scarcely defined by travel. Certainly it could not be dignified as a trail, though the passing years have erased most of the details, a few spots can still be pictured, with remarkable clarity. In one place, the trail climbed a steep knife-edge ridge, such as may sometimes be seen on the sides of arid mountains. This ridge was so narrow that one could scarcely maintain footing. A slight misstep to either side would have sent the traveler spinning to dizzy depths below. In another place, remembered for its beauty, alone, the way skirted a swift, cool stream, overhung with verdure, and crossed and recrossed by great broad-winged bamboo butterflies of opalescent hues.

The night we finished the ascent to the Mexican Plateau (probably three or four days from the Coast), is distinctly remembered, on account of the unusual happenings. There were many Indians congregated at the place. With but little interest in their doings, and tired from the long trail, I stretched on a bench, and tried to defy their noise with sleep. Around a huge fire the Indians danced and sang and whooped. As the night wore on, their noise grew ever louder. At the time I regarded it all as a common "borracho" (drunk), which was disturbing to sleep, but of no other interest. But in the light of present knowledge, there seems little doubt that I slept through a Peyote Ceremony, and that the next day, just as innocently, I experienced the sensations produced by the drug.

When traveling in foreign lands, it has ever been my custom to live, as much as possible, as do the natives, and above all, to familiarize myself with what they eat. If those Indians offered something they themselves were eating, there is no doubt but that I would have eaten of it, and if, like Peyote, it had no characteristic flavor or noticeable quality, it is probable that by now it would be forgotten.

In the morning, after a cordial leave-taking from the Indians, we proceeded on our way. Soon a great change took place, a change that my words can most imperfectly express. The light became dazzlingly white, and shone with a superb brilliancy that is beyond description to those whose conception of light is derived from sunshine or firelight. There were no colors present, just a white radiance that did not resemble sunlight, nor even the burning of magnesium. Though my mind seemed clear, I did not realize that this light was not a reality. On the contrary, for many years I connected the Mexican Plateau with dazzling white light, and on a subsequent journey, I was bewildered to find the light normal. Soon I commenced to see animals, of species I had encountered during the months preceding, and also many others from distant regions. There were bears, jaguars, sea-lions, deer and many others. They were not ill-defined creations of the imagination, such as one may idly trace in stones or clouds, but were as true to life as if they lived and breathed. We passed among them. They were on both sides of the trail. Though my eyes saw them plainly, my mind was not deceived. At least I remember that I would ride up to a seal or deer, without surprise to have it dissolve into a stone or stump.

Many times during the years that followed, I have attempted to describe the great light, and the visionary animals of the Mexican Plateau, though until learning of the narcotic drug, Peyote, and its uses by the Indians among whom I was traveling, I attributed my hallucinations to a brain unbalanced by the effect of heat and light. But whatever the cause of the hallucination, the animals that stood in the bright light, remain as one of my plainest and most pleasing memories.

POISONS AND THEIR EFFECTS.

G. Roche Lynch, speaking on the above subject to the members of the British Pharmaceutical Society at a London evening meeting, gave the following definition of a poison:

"In popular language a poison is a substance which, when taken in small quantity, is capable of causing illness or death. But such a definition is far too restricted from a scientific point of view. For instance, it would obviously exclude certain of the less poisonous substances, such as copper, where very large doses are required to produce serious illness, and of course copper very rarely causes death. A more scientific definition is perhaps as follows: 'A poison is a substance which, when taken by the mouth or when absorbed into the blood, is capable of seriously affecting the health or of destroying life by its action on the tissues with which it immediately or after absorption comes into contact.' "

He referred to four landmarks in the history of toxicological investigation: 1836, Marsh; 1839, Orfila; 1844, Fresenius; 1850, van Stas.

Before closing, Mr. Lynch said that "the control of the distribution of poisons in Great Britain is largely in the hands of members of the British Pharmaceutical Society, and so long as it remains in such capable hands, I feel we shall have but little to fear. Of course, the restrictions are made, so it is not fair to the community virtually to prohibit the sale of poisons. But it is also clear that whatever changes are made will be in the regulation of the tightening, not loosening, of these regulations. Thus, I am a little apprehensive of some of the provisions of the proposed Poisons and Pharmacy Bill, in that it may place in the hands of those who have not had the training and experience of pharmaceutical chemists a number of powerful poisons which will in turn become easier of access to the public."

AN INTERESTING COLLECTION OF APOTHECARIES' SHELFWARE.*

BY CHARLES H. LAWALL AND MILLICENT R. LAWALL.

Collections of drug jars are not uncommon in European museums, but they are exceedingly rare in America. However, even in Europe the museums of each particular country specialize in specimens pertaining to that country. One of the few places where drug jars of various times and many countries may be seen is the Wellcome Historical Medical Museum in London, where entire pharmacies of early periods are exhibited with stocks and fixtures, apparatus and shelfware.

Even the literature in our own country has contained few contributions of interest and importance pertaining to this subject. The English and the German pharmaceutical journals frequently contain interesting and well-illustrated articles and the yearly issues of the *Deutsche Apotheke Kalender* have contained many fine photographs of drug jars.

There is an interesting reference to apothecaries' jars in one of the recent books of 1932, *The Letters of Katherine Mansfield*, in one of which, written from Switzerland, she says: "Your eyes, green with envy would have been fixed on, hypnotized by two very old apothecary's jars on my dressing table. Murry who is a *very* good nose-flattener has been gazing at them for days and yesterday he bought them. They are tall milk-white jars painted with a device in apple green, faint yellow and a kind of astery pink. They have gold tops. On one in exquisite lettering is the word *Absinthii*, on the other *Theriaca*. We intend to keep pot-pourri in them during our lives and after our deaths we intend to put our ashes in them. I'm to be *Absinthii* and M. *Theriaca*. So there they stand, our two little coffins, on the dressing table."

The latest and most interesting contribution to the literature of the subject is a book called *Early English Drug Jars*, by Geoffrey Eliot Howard. Mr. Howard's book, which is interestingly written and splendidly illustrated is especially concerned with specimens of Lambeth Delft, an English variety of drug ware of the 17th and 18th centuries.

The collection which we are attempting to describe in this contribution is permanently on exhibition in the library of the Philadelphia College of Pharmacy and Science. It is not a great collection in point of numbers but it is interesting as to scope, both chronologically and geographically. These jars have all been presented to the College by an honored alumnus, Mr. David Costelo of New York City, who has taken pains to verify the authenticity of the items and who has been of substantial help in translating obscure labels for forgotten preparations of by-gone periods.[1]

* Section on Historical Pharmacy, A. PH. A., Toronto meeting, 1932.

[1] Mr. Costelo has been kind enough to furnish the following information concerning the sources of some of the jars in this collection:

"*Castel Durante*" is a small town in Italy near Urbino, where a great trade was carried on at one time in the manufacture of pharmacy jars, "Vasa da Spezieria" as well as other articles of majolica. The term *majolica* or maiolica which was given to a certain type of pottery was probably a corruption of the name of the island in the Mediterranean Sea now known as Majorca, which was noted for its pottery at a very early period.

The distinguishing feature of majolica is the thick white glaze which results from the introduction of oxide of tin into its composition.

A collection of this kind may be viewed from several standpoints. A connoisseur in ceramics would look at the specimens from one angle, while one interested in the history of pharmacy would find intense and romantic interest, perhaps, in a jar of little intrinsic worth because of its label or its historic associations. This is eloquently exemplified by the following quotation from Mr. Howard's previously mentioned book:

> "How can any one possessed of a grain of imagination fail to experience a faint thrill of emotion on remembering the generations of apothecaries who have used one of these jars? *First*, the original owner in his bottle-glass bow-windowed shop with his alchemical apparatus in full blast in the 'elaboratory' behind. Then the generations of his successors in their perukes, long coats and knee-breeches, serving their customers during the Georgian era. What talks there must have been across the counter while the apothecary weighed out his drugs from these jars. The news of Sedgmoor, the flight of James II, Marlborough's victories, all the excitements of the Old and Young Pretenders, the Gordon Riots (in which indeed not a few sets of Jacobean jars were probably destroyed), the French Revolution, and everything that stirred the minds of English men and women for 150 years and more, were discussed around these little pots till they almost become part of our history. And if they could speak there are few of them that could not tell of famous figures in every walk of life who, during that period, partook of their contents. This is a certainty which may very legitimately stir our imagination; a certainty applicable to few other relics of the past obtainable by the ordinary collector.

This use of tin was known to the ancient Babylonians who employed it for glazing certain kinds of bricks.

The Arabs employed it in the 8th century and it was no doubt introduced into Spain by the Moors.

The potteries at Castel Durante were under the patronage of different noble families at various periods in their history and Pope Urban VIII raised the town to the rank of a city on account of its importance in this connection.

Faenza was one of the earliest places celebrated for the manufacture of the type of pottery called majolica and it was this city that gave its name to the ware that the French call "*Faience*," by which they distinguished tin-oxide enameled pottery from other varieties.

"*Majolica*" and "Faience" therefore are essentially the same, being composed of clay covered with a white enamel glaze containing tin oxide.

"*Talavera*" is a town in the province of New Castile Spain (Talaveradela Reyas). In the sixteenth century it was noted for the manufacture of enameled ware of the majolica type. A set of drug jars is said to have been made for the Medici to be used in the dispensary attached to the Ducal Palace.

Alcora, Spain, was another center for the manufacture of tin-oxide enameled pottery. It was at one time under the protection of the Count of Aranda. The decorators at Alcora divided their time between potteries in France and Spain. The French influence seems to be noticeable in the jars in this collection which are ascribed to Alcora.

"*Rouen*," France, was a center for the manufacture of pottery early in the 16th century. It attained to great celebrity and prosperity in 1542 during the reign of Louis XIV, who ordered a complete service of the Faience made at Rouen, and about this same time one large order for shelfware for a pharmacy in Paris is mentioned. The decorators at Rouen were brought from Italy and Holland and many potteries were established in this district.

"Delft" of course was the majolica ware made in Holland. "*Lambeth-Delft*," however, is the name given to the "tin enamel" ware made at Lambeth, England. This is the ware to which Mr. Howard's book is entirely devoted.

The potters and decorators at Lambeth were brought from Holland.

It will thus be seen that the course of the progress of the manufacture of "tin-enamel" ware was northward from Spain when it was first employed in Europe.

Nos. 1 and 1a.—A pair of French Jars of about 1810.

Nos. 2 and 2a.—A pair of early 18th Century Spanish Jars (Talavera).

No. 3.—A 17th Century Spanish Jar (Talavera).

Nos. 4 and 4a.—A pair of French Jars of the Empire Period.

Nos. 5 and 5a.—A pair of 17th Century Italian Syrup Jars with pewter lids.

No. 6.—A 17th Century Spanish Jar (Talavera).

> "The apothecaries' jars are vessels into which every western mortal must indirectly dip, willingly or unwillingly, during his lifetime, and from one or another of these surviving specimens of XVIIIth century Lambeth from the City of London, there is no reasonable doubt that kings, queens, Oliver Cromwell, Pepys, Nell Gwyn, Titus Oates, the great figures at Court, the soldiers and the statesmen of that era, were served.
>
> "In passing it must be remembered that apart from apothecaries, there were also druggists, who sold crude drugs, herbs and roots, gums, candles and spices. To some extent they trenched on the activities of the apothecaries and probably also had jars in their shops."

If Mr. Howard's imagination can be so effectively stirred by the collection of English jars which he so well describes, how much more can one's fancy run riot over jars from France, Italy and Spain, in addition to the English, and covering a range of nearly four hundred years of time.

Before going into details of the description of the collection herein listed it may be well to consider some general principles. Some few of the jars have hinged pewter lids, and one interesting pair (Nos. 20 and 20a) have porcelain lids, perforated so they can be tied fast to the jar with a cord or leather thong. Some have well-fitting porcelain or pottery lids not attached to the jars in any manner. The majority of the older jars, however, were supposed to be kept closed by parchment tied over the top, as was the custom with ointment jars and gallipots for many centuries. In some cases, in fact in the majority, identifying labels are burned permanently into the glaze of the jar. In a few instances no labels are present, nor is there any blank space left in the design for a label. Coats of arms and heraldic insignia of various kinds are fairly common. Most of them are decorated in polychrome.

Drug jars have had their part in the development of our present legible alphabet. One who has attempted to read ancient inscriptions—except in Roman characters—will appreciate the value of this influence.

In a book entitled "Alphabets," by Edward F. Strange, published in London in 1895, the following pertinent statement occurs:

> "An important group of painted letters is to be found upon the many fine examples of majolica which remain to us; and among these the labels on drug pots are especially pre-eminent and of practical value; inasmuch as the very essence of their being was the necessity of conveying concise information legible at a distance. This end can, of course, be easily—not to say brutally—attained in a variety of ways; but the pot makers and painters being as a rule artists in the high sense of the word, we find in their letters a charming grace, quite worthy of the good colouring and ornamentation which accompanies them. Our examples (several illustrations are given) for the most part from Italian examples of the fifteenth and sixteenth centuries, will, although, not furnishing complete alphabets, sufficiently suggest the treatment which well-known forms have received in this material. The process by which these results are arrived at must be borne in mind when criticising them, especially the limitations imposed by the need of allowance for the effects of firing the semi-fluid vitreous substance composing the coloring matter; which also is applied to a surface entirely, and fortunately precluding the fine accuracy of engraved work."

The symbolism is particularly interesting in Nos. 8 and 8a, which show the figure of St. Luke; in No. 14, showing St. Martin dividing his cloak with a beggar; and in No. 25, which has the seated figure of The Queen of Sheba at the base of the handle.

Nos. 7 and 7a.—A pair of Early 18th Century Spanish Jars (Alcora).

Nos. 8 and 8a.—A pair of 16th Century Italian Jars (probably Castel Durante).

Nos. 9 and 9a.—A pair of Early 18th Century Spanish Jars (Alcora).

Nos. 10 and 10a.—A pair of late 17th Century Spanish Jars (Catalonia).

No. 11.—Early 16th Century Italian Jar (probably Castel Durante).

Nos. 12 and 12a.—A pair of 17th Century Italian Jars.

One is forced to the conclusion, after looking at the shapes of most of the jars that they may have added beauty to the shop but that they must have been very unhandy from the utilitarian standpoint, with their narrow tops and tapering sides, this type being given the distinctive name of "alberello," and in the case of the jars with spouts for syrups and similar liquid preparations the spoilage must have been rapid in warm weather, and one shudders to think of the entomological collections which would be attracted by the open spouts.

In describing the jars we have given fairly complete details as to dimensions and the colors used in the decorations, in addition to the photographic reproduction of each specimen; also details concerning the label translations and an outline of the character of the preparation in each case. The words "Talavera," "Alcora," etc., in parentheses in the descriptions of the Spanish jars refer to the towns where potteries were established from which these special jars came.

The detailed descriptions and accompanying facts of interest concerning each specimen are as follows:

Nos. 1 and 1a.—Pair of French jars of about 1810; white glazed porcelain decorated in red, black and gold; heighth, 10 in., diameter at bottom, $4^1/_2$ in. On No. 1, picture of Hippocrates in circular, white on black background; on No. 1a, similar picture of "Galien." Around the pictures both jars are ornamented with crossed anchors with serpents twined round the shafts, and a rod with wings—a form of the caduceus. Gold bands around the knob of the lid and top and bottom of jars; acorn decorations on ends of bar which holds the scroll bearing the label.

Label on No. 1: "Benjoin de Siam;" Siam Benzoin.

Label on No. 1a: "Beur: de Muscad:;" Beurre de Muscade—nutmeg butter, made by hot expression from grated nutmeg.

Nos. 2 and 2a.—Early XVIIIth century jars, Spanish (Talavera). Heighth, 8 in., diameter at top, $5^1/_4$ in. Tops flared, probably for tying parchment or cloth over them. White, with elaborate blue decorations. Yellow shield or panel on front surmounted by a crown, with the letters "A. M. G. P." in brown on a diagonal band across the panel; these letters are probably the initials of the owner or of an organization. Decorated in front only; no labels.

No. 3.—XVIIth jar, Spanish (Talavera). Heighth, $10^3/_8$ in., diameter across top, $4^1/_4$ in. On front an elaborate shield with heraldic crest on top and bird "rampant" with a crown floating over its head, and a yellow bar crossing the body; elaborate feather and ribbon decoration around the shield in blue and yellow. No label.

Nos. 4 and 4a.—Jars of the French Empire period; from an old shop in Paris. Heighth to top of lids, 10 in.; heighth of jar without lid, $6^3/_4$ in.; diameter, $4^1/_4$ in.; tapering dome-shaped lids. White, decorated in front with two trees, one on each side, with green leaves and pink blossoms, resembling palms, with serpents twined round the trunks of trees; plants at foot of trees on green ground, and a sort of pink bird bath.

Label on No. 4: "Ext: de Belladon." Extractum de Belladonna, a preparation made from the fresh herb—really an inspissated juice.

Label on 4a: "Ext: D'Opium." Extractum d'Opium, made a century ago by cooking 1 lb. of opium with 4 lbs. of water in a tin vessel on a sand-bath for *six months*, after which it was cooled, strained and evaporated to a pilular consistency.

Nos. 5 and 5a.—XVIIIth century Italian syrup jars; made to stand on shelf with handles facing front; pewter lids. Heighth to top of lid, $8^1/_4$ in.; diameter of body at widest part, 8 in.; two-inch spout. White with blue stripes on handle and blue scroll decorations on each side of handle.

Label on No. 5 in brown letters: "S Papau R." Syrupus Papaveris, also known as "Diacodium," made by the following formula:

White poppy heads, fresh, mature	2 lbs.
Black poppy heads, fresh, mature	1 lb.

Nos. 13 and 13a.—A pair of Early 18th Century Spanish Jars (Alcora).

No. 14.—A 16th Century Italian Jar (Castel Durante). A rare specimen.

Nos. 15 and 15a.—A pair of Early 19th Century French Jars.

Nos. 16 and 16a.—A pair of 15th Century Italian Jars.

No. 17.—An Early 18th Century Italian Jar.

No. 18.—A 16th Century Lambeth Delft Jar. A rare specimen.

Cut up the poppy heads and infuse in 8 lbs. of boiling water for 24 hours, then boil down to half the volume. Strain and express, clarify with egg albumin, add 3 lbs. of sugar and cook to produce a syrup *secundum artem.*

Label on 5a: "S Granat." Syrupus Granatorum—pomegranate juice extracted and purified; sugar, of each, 2 lbs.

Cook with gentle heat to produce a syrup.

No. 6.—XVIIth century jar, Spanish (Talavera, near Toledo). Heighth, $11^{3}/_{4}$ in.; diameter, $4^{1}/_{4}$ in. White decorated in blue; front panel resembles a coat of arms with tassels at each side. Paper label pasted on bottom of jar with inscription "Talavera grande;" written label pasted on front with the word "Vere" on it. No burned in label.

Nos. 7 and 7a.—Early XVIIIth century jars, Spanish (Alcora). Heighth, $10^{1}/_{4}$ in.; diameter, $4^{1}/_{8}$ in. White with vine wreath partly around shoulders in shades of brown; decorative border round bottom. Oval panel in front with flowers at top and two fern-like leaves crossed at bottom.

Lable on No. 7: "R. Bistort." Radix Bistorte; the root of *Polygonum Bistorta,* also called *Colubrina* and *Serpentaria Vulgaris.*

Label on 7a: "S. Alexand." *Senna Alexandria:* Our present official Alexandrian Senna.

Nos. 8 and 8a.—Pair of XVIth century Italian jars, probably Castel Durante. Heighth, $10^{7}/_{8}$ in., $4^{5}/_{8}$ in. across top. On front, elaborate picture of St. Luke wearing a mitre, halo around head and crozier with triple cross in hand; figure elaborately dressed in embroidered robes; dog or some other animal with curly tail at feet; at right of figure the letter S and at left, the letter L, meaning St. Luke. Heavy border of rosettes and curlicues around figure. No label, but a blank label panel below figure.

Nos. 9 and 9a.—Early XVIIIth century Spanish jars (Alcora). Heighth, 11 in., diameter at top, $4^{5}/_{8}$ in. White with decorative border half way around shoulders in blue and brown and a different border around the bottom.

Label on No. 9: "Mirab. Bellir." *Myrobalani Belliricae,* a highly esteemed variety of myrobalanus, a laxative astringent drug; introduced by the Arabians and still used in European medicine and pharmacy.

Label on 9a: "R. ℈ Yerb." *Radix Contrayervæ,* a South American drug originally believed to be an antidote to all kinds of poisons, later used as a tonic and diaphoretic. Note the interesting way of abbreviating "Contra" by reversing the initial letter.

Nos. 10 and 10a.—Late XVIIth century jars; Spanish (Catalonian). Heighth, $8^{3}/_{4}$ in., diameter, $3^{5}/_{8}$ in. Catalogue No. 450 pasted on. Elaborate panel with crown on top.

Label on No. 10: "S. CVCVRBT." *Semen Cucurbitæ,* also called *Semen Peponis,* known to us as Pepo or pumpkin seed.

Label on 10a: "C. AVRANTIOR." *Cortices Aurantiorum,* our present official orange peel. The "V" is intended to be "U;" they were often interchangeable. Notice the reversed "N;" the printer must have been the ancestor of many sign painters of the modern times.

No. 11.—Early XVIth century Italian jar, probably Castel Durante. Heighth, $8^{3}/_{4}$ in., diameter across top, $3^{5}/_{8}$ in. White and fully covered with blue decorations of vine-like leaves and stems.

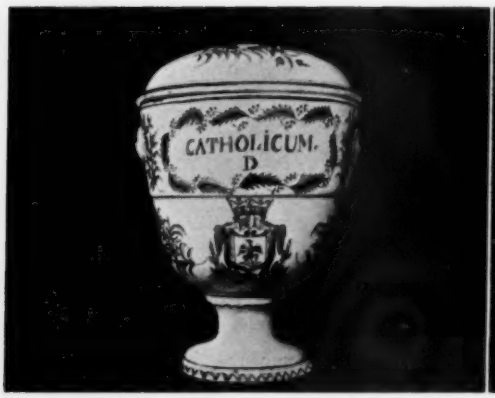
Label: "S Viola Io." Violet seed was the part of the plant most commonly used. "Io" probably stands for the Greek goddess after whom the violet was named.

Nos. 12 and 12a.—XVIIth century Italian jars. Heighth, $8^{3}/_{4}$ in.; diameter, $3^{1}/_{2}$ in. White, very fully covered with blue decorations. Circle at bottom in yellow and blue resembling a coat of arms—pillar at left, diagonal bars and rosettes at right.

Label on No. 12: "Emp. d. Melilo." *Emplastrum de Meliloto,* made from melilot flowers, orris root, fenugreek seed, wormwood leaves, ammoniac, myrrh, cyperus root, althæa root, Celtic nard root (a variety of valerian), laurel berries, chamomile flowers, saffron, yellow wax, white pitch, goat suet, Venice turpentine and oil of wormwood, made into a plaster *secundum artem.*

Label on 12a: "Emp. Tria. farm." *Emplastrum Triapharmacum,* a preparation attributed to Mesue, the Arabian pharmacist-physician of the 10th century; made from litharge, strong red-wine vinegar and old olive oil, cooked together until a plaster mass is formed.

Nos. 13 and 13a.—Pair of jars of the early XVIIIth century, Spanish (Alcora). Heighth, 10 in.; diameter, 4 in. White, with blue border around shoulders and bottom. Oval shield in front with yellow flowers on top and bottom.



No. 19.—An 18th Century French Jar (Rouen).

Nos. 20 and 20a.—A pair of 15th Century Italian Jars.

No. 21.—An 18th Century French Jar (Rouen). A rare specimen.

No. 22.—A 17th Century French Jar.

No. 23.—A 17th Century French Leech Jar.

No. 24.—An early 19th Century French Jar.

No. 25.—A 16th Century Italian Jar (Castel Durante). A very rare specimen.

Label on No. 13: "G. Elemó." *Gummi Elemi*, a resin known as elemi or gum elemi, frequently used as an ingredient in plasters.

Label on No. 13a: "G. Mirrh." *Gummi Myrrhæ*, our present official gum resin myrrh.

No. 14.—Early XVIth century Italian jar. This jar is mentioned in Chaffer's *Pottery and Porcelains*, under Castel Durante.

Heighth, $9^1/_2$ in.; diameter, $4^1/_8$ in. White with border around top and picture on front of St. Martin of Tours on a fiery horse, dividing his cloak to give part to a beggar on crutches with one leg doubled up on a support. On back of shoulder of jar is the emblem ✠, and one also at bottom. Monogram on back, consisting of what seems to be a large C with a cross through it and the joined letters R and T or R and A; crown on top of C, and the date "1701" beneath monogram.

Label at bottom: "Gum. Heder." *Gummi Hederæ*, an exudation of the English ivy, when it grows in subtropical countries, as in N. Africa. It was formerly much used in plasters and in those depilatory preparations which were then melted and then poured on the skin and removed after cooling, pulling the hairs out by the roots.

Nos. 15 and 15a.—Jars of French porcelain, Empire period (1804–1814). From the Aliton Pharmacy in Port Jervis, N. Y. There are about 25 of these still in existence. The original set was brought from Philadelphia in about 1810 by Mr. St. John, who established the pharmacy in Port Jervis. Heighth, $11^3/_4$ in. to top of knob of lid; largest diameter across flat side, 6 in. These jars are not round, but flat and octagonal. Gold bands top and bottom, ornate panel in front in gold, blue and red.

Label on No. 15: "EMPL: PIC: BURG:." *Emplastrum Picis Burgundicæ*, a plaster made from Burgundy pitch, labdanum, rosin, yellow wax and olive oil.

Label on 15a: "UNG: SULPH: C." *Unguentum Sulphuris Compositum*, made from sublimed sulphur, potassium carbonate, and lard, corresponding closely to the alkaline sulphur ointment of the N. F. V.

Nos. 16 and 16a.—Very old Italian XVth century jars. Teapot-like vessels about $9^1/_2$ in. high. White, with very light blue, crude decorations. Flowers at top and bottom of labels.

Label on No. 16: "ACQ. BORRAGGI." *Aqua Boraginis*, made by distillation from the fresh borage herb, commonly known as bugloss.

Label on 16a: "ACQ. ANONIDIS." *Aqua Ononidis* (*Anonidis*), made by distillation from the fresh ononis herb, commonly known as restharrow.

No. 17.—Squat jar of the early XVIIIth century; Italian. Heighth, $7^5/_8$ in. Lid missing. Top diameter, $4^7/_8$ in. White, elaborately decorated with blue. Border around bottom, with egg-shaped decoration in center of front bearing a divided canopy at the top disclosing a star above the alchemistic sign for sublimation, and beneath the latter the initials "I. F."

Label: "Empl. far. Orob. ad Carbone." *Emplastrum Farinæ Orobi ad Carbone*, a mixture of charcoal and the meal of the orobis bean (*Ervum ervilla*); used as a plaster or poultice by mixing with water.

No. 18.—Lambeth Delft squat jar with lid; a rare XVI century specimen. Heighth, 10 in.; bottom diameter, $6^1/_2$ in., top diameter, $4^1/_2$ in. White, decorations blue; lid of pewter. Typical Lambeth design with a peacock on each side of the panel.

Label: "EL BEN-LAX." *Electuarium Benedicti Laxativum*, a very complex preparation containing the following drugs: Turpeth, esuda, pityusa, diachridus, hermodactyl, rosa rubra, benedictus, zingiber, nardus Indica, crocus, saxifraga, piper longa, amomum, cardamom, petroselinum semen, galangal, macis, foeniculum, asparagus, ruscus, miliifolium, carum, sal gemmae, saccharum, and mel despumatum. Many of these drugs are unknown and unused at the present time.

No. 19.—XVIIIth century pharmacy jar from Rouen, France; old Delft. Decorations, blue on white. Flat, dome-like lid. Total heighth, $14^3/_8$ in.; heighth of lid, 4 in.; diameter of lid, $8^1/_2$ in. Diameter of base, 5 in. Lid bears decorations of sprays like ferns; label panel surrounded by heavy fern-like branches, with finer sprays between. Below the label panel is an elaborate shield surmounted by a large crown, the shield bearing an eagle with outstretched wings, and with a laurel wreath around the bottom. Decorations on each side of shield similar to those on top of lid.

Label: "CATHOLICUM. D." *Catholicum Duplicatum*, a popular electuary of the 18th

century, also known as Diacatholicum. It contained polypody root, fennel seed, cassia fistula pulp, tamarind pulp, rhubarb, senna, violet seed, aniseed, licorice, the four cold seeds (pumpkin, cucumber, colocynth and watermelon), and sugar, made into an electuary *secundum artem.*

Nos. 20 and 20a.—Italian pharmacy jars of the 15th century. Heighth to top of lid, 10 1/4 in.; diameter of foot, 4 1/4 in.; diameter of lid, 4 1/4 in.; heighth of lid, 2 in. Decoration of leaves and scrolls surrounding label panel, light blue on white, and black letters on label. Lid tied on with leather thongs passed through two holes in jar and lid.

Label on No. 20: "V. Agripp." *Unguentum Agrippæ* (*Unguentum Bryoniae*), made from bryonia juice, elaterium juice, squill, German iris root, male fern, white wax, fenugreek seed and linseed oil; made into an ointment *secundum artem.*

Label on 20a: "Diaprun." *Diaprunum*, a complex electuary made from fresh Damson plums with violet seeds, cassia fistula pulp, tamarind pulp, rhubarb, red rose petals, yellow sandalwood, red saunders, grated ivory, licorice juice and the four cold seeds, made into an electuary with sugar.

No. 21.—Rare French pharmacy jar from Rouen potteries, bearing the monogram of Stanislaus I, King of Poland (1705–1766). Design in rose, yellow and green, with crown. Over-all height, 11 1/2 in.; diameter of base, 4 1/4 in.; diameter of lid, 3 5/8 in.; heighth of lid, 3 1/4 in.; heighth of jar without lid, 9 in. Picture of dragon fly in fine detail on back of jar. "No. 1" in label panel.

When Stanislaus went to live in France, he evidently interested himself in the arts of the Nancy district, and particularly the potteries, and decorators for the work were brought from Italy and Holland. The principal pôtteries were in Rouen, and Mr. Costelo says he believes the Italians almost always used an insect of some sort in their decorations.

The story of how this jar came to Mr. Costelo is very interesting. A friend of his was visiting in Nancy, and through Mme. Coué met the nephew of the owner of the pharmacie in which the jars were. Of course, the jars were not for sale, but she told him about Mr. Costelo's collection and of his generous gifts to the College. Then she expressed her willingness to make a contribution for some Nancy "*Oeuvre de Charite*," and so the Stanislaus jar came into her possession.

No. 22.—Theriac jar of the period of Louis XIV (1638–1715). Lid missing. White, with green and yellow wreath of oak leaves in front with reddish brown bowknot at bottom of wreath. Over-all heighth, 8 1/2 in.; diameter, 4 1/2 in.

Label: "Theriaca: androm." *Theriaca Andromachi*, a highly complex electuary containing from 60 to 100 ingredients. It was named for Andromachus, the physician of Nero, who is claimed to have improved the formula by adding viper's flesh.

No. 23.—Leech jar of the Louis XIV period (1638–1715). Heighth, 8 1/2 in.; diameter of bottom, 4 in.; diameter of top, 3 1/8 in.; diameter of widest part of body, 4 1/2 in.; diameter across handles, 7 in. White with curious design in yellow and blue of a face and leeches, the latter raised.

No label.

No. 24.—Pharmacy jar of Napoleonic period (1804–1814). Octagonal in shape. Heighth, 11 3/4 in.; diameter of bottom, 3 7/8 in.; diameter of lid, 4 in.; heighth of lid, 3 5/8 in.; heighth of jar alone, 7 5/8 in. Design in green, gold, brown, red and lavender.

Label: "PIL: SCILL." *Pilulæ Scillæ*, a popular pill of a century or more ago, made from powdered squill and ammoniac.

No. 25.—Majolica pharmacy jar; Castel Durante pottery of the XVIth century. There are only a few specimens of this kind known: One in the British Museum, London; one in the South Kensington Museum, London; one in the Museé Cluny, Paris, one in the Louvre, and one in Sevres, and this one.

Heighth, 8 3/8 in.; diameter of bottom, 3 1/4 in.; diameter of top, 3 1/2 in.; diameter at widest part of body, 6 1/4 in.; handle, 2 1/8 in. broad and 3 in. high. Jar entirely covered with

design of military character (drums and armor) in blue, yellow and white. Mr. Costelo says that in about 1519 the decorators of the Castel Durante pottery were very fond of using for their work "Armorini" and scrolls. Handle bears an alleged figure of Cleopatra.

Label: "MIVA AROMA." Miva Aromatica, a "Rob" (very heavy syrup or conserve) composed of quince pulp, orange peel, cinnamon, cardamom, saffron, cloves, ginger, mastic and mace.

This is the collection we have started out to describe. There is room for research as to the individual history of these jars. Many of them are very beautiful, all of them are interesting, and most of them are in first class condition, with the exception of a few missing tops or lids. They represent periods of pharmaceutical progress which had something in common, but which are so different from the present that we cannot find a common divisor with which to make comparisons.

American pharmacists have been destroying the landmarks which would have formed the connecting links between these two dissimilar eras. Witness, for instance, the discarding of the colored show globes and the destruction of pieces that would have been listed as almost priceless collectors' "items" of the next century. The oldest of the jars we have described were of 15th century Italian origin, and were used in some distinguished pharmacies of that time when Columbus set sail for the Indies which he never found.

When we look about to-day at the possible collectors' "pieces" of the future, one is appalled at the lack of material of interest. Gone is the shelfware of even a century ago. Where has it gone? Can any of it be salvaged? Is it worth while to look for any of it? Where would we keep it until it becomes valuable or even interesting? Will the historian of the future have to visit Greenfield, a suburb of Detroit, that unique community established by Henry Ford, in which is preserved the tangible evidence of the second pre-Elizabethan Era? It is rumored that a late 19th century pharmacy is on exhibition in this model village from which motors are banned along with contagious diseases.

In the therapeutic cemeteries of forgotten generations of physicians may be found the formulas for the preparations which once filled the majority of these jars. A bare half dozen of the jars contained drugs which are still used to-day. The changing nomenclature of the ages makes it necessary to use a glossary to interpret even the names of the preparations, and a study of the formulas themselves reveals a collection of polypharmacal monstrosities containing ingredients which are difficult of identification after the lapse of a few centuries.

Is our shelfware of the present worthy of preservation and will it be of interest centuries hence?

Time alone will tell.

If any readers of this article have enlightening information as to any of the types or specific examples here described in, we should be glad to hear from them.

All of Priestley's writings on chemistry are pervaded with the spirit of observation; they breathe an attractive frankness which caused Franklin to address him as the "honest heretic." It was no effort for him to "open his mind" to whomsoever he was talking; and in one place he boldly claims that he never concealed his knowledge from any one.

THE DEPARTMENT OF THE AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY

C. B. JORDAN—CHAIRMAN OF EXECUTIVE COMMITTEE, A. A. C. P., EDITOR OF THIS DEPARTMENT.

THE INTRODUCTORY COURSE IN BOTANY.*

BY H. B. SIFTON.[1]

"Shall we employ a botanist with no training in pharmacy to teach introductory courses in botany to students of pharmacy? The Editor believes there can be but one answer to this question, and that is 'Yes,' provided the instructor is sympathetic with pharmaceutical education. Professor H. B. Sifton, whose paper on 'The Introductory Course in Botany' follows, is one of these scientists who can appreciate the viewpoint of the professional man and therefore can teach a fundamental course with illustrative material from the field that the student plans to enter. His paper is a very timely one and its careful perusal will be beneficial to all those engaged in the field of pharmaceutical botany."—C. B. JORDAN, *Editor*.

As one whose small knowledge of things pharmaceutical has been entirely self-taught, I have accepted with some diffidence the honor you have done me in inviting me to discuss before you the teaching of Botany to students in Pharmacy. On the contrary, I accept with alacrity the opportunity thus afforded of acknowledging the kindness and help invariably extended to me by members of your organization. Some years ago, when planning my first course for Pharmacy students, I paid a brief visit to a number of Colleges of Pharmacy in the United States, in order not to be too much out of step in my teaching. On that occasion I was received with such kindly courtesy that it was with a tinge of regret that I found that the time had come to return to earth and ordinary routine.

In planning such a course as we are to discuss, the first necessity is to outline in our own minds a precise concept of what useful additions the course, if successful, may make to the stock-in-trade with which we equip our students before abandoning them to the ruthless competition of the modern world. After that, it merely remains for each individual teacher to outline a mode of procedure by which he, with his peculiarities of mind and training, may best accomplish the object in view. I venture to say that if a sort of botanical millenium were to arrive, and each of us were in some miraculous way to become a perfect teacher with a perfect course, one might circle the globe without finding two courses identically the same, for personalities differ, and the course that does not reflect the personality of the teacher cannot be perfect.

Perhaps we may profitably spend a few moments considering the former of our two problems. What should we teachers of Pharmaceutical Botany aim to give our students? There are certain bits of botanical knowledge that are useful as tools to the pharmacist, knowledge without which he cannot intelligently read the literature of pharmacy, or discuss pharmaceutical problems. He must, to select an example, appreciate the meaning of the morphological and systematic botanical terms used in describing vegetable drugs. If you will pardon a personal allusion,

* Delivered before the Teachers' Conference on Materia Medica, Toronto meeting.

[1] University of Toronto.

I may say in passing that when planning our course, I systematically covered a number of standard works on Pharmacognosy, listing the botanical terms they utilized, and was rather pleased to find it unnecessary to add to those we had been using in our general botanical courses.

Before this audience it would be mere presumption on my part to spend time discussing further the details that, as every pharmacist knows, should be included in the course, for use in more specialized courses to follow. One point in this connection has, however, intruded itself on my attention, and I wish to suggest it for your consideration. All these facts and details are a part of the senior courses, and could be acquired by the student in his study of pharmacognosy, physiology and microbiology, were there no introductory course in botany at all. If they constitute the sole, or even the main reason for the existence of the botany course, I suggest for your consideration the question whether the course might not profitably be abolished, the time at present devoted to it, to be allotted to these other subjects.

Personally, I should be very sorry to see such action taken, for while fully cognizant of the importance of the details we have been considering, I am convinced that the greater value of the course, the real reason for its existence, is to be found elsewhere. It lies in the training in scientific thinking and scientific methods of procedure, which, if properly imparted, will be an invaluable aid to the student in his more advanced studies and throughout his life.

If this is admitted, consideration must be devoted, when planning the botany course, to two further aspects of our problem. What, exactly, do we mean by scientific methods, and how may they best be inculcated? To be a scientist, one must add to the gifts with which Nature has provided him, three things that we may help him to acquire:

(1) Facility in ascertaining, evaluating and logically arranging the discoveries of earlier investigators.

(2) The faculty of seeing clearly and exactly any additional facts brought to light during his own work.

(3) The ability to record his findings with precise accuracy of detail for the use of future students of his subject.

Keeping these principles constantly before him, and not forgetting to include those details that will be useful in the student's future work, each teacher may plan his own soundly scientific course. There will be differences of detail, arrangement and emphasis, depending on the personality and training of the teacher. These differences matter little in comparison with the desirable features that would be lost were all of us to attempt to subject ourselves to a common standardized curriculum, and set of rules.

In planning the course, certain general principles should be observed. It should have unity. The arrangement of material should be such that the student can realize the essential unity of plan underlying the plant kingdom, and reason from one part to another, thus minimizing the amount of deadening memorization. It should be interesting, not through the artificial injection of bizarre forms, and experiments otherwise unnecessary, but with a unified interest due to logical arrangement and clear exposition. In this way a stimulus to scientific reasoning and imagination is achieved. It should be difficult. If it is made easy the student

will have no incentive to exercise his talents, they will not be developed, and the course will be relatively useless. The student should be led to exercise his own initiative and depend on his own powers of reasoning and observation, and in laboratory work absolute accuracy, even in the smallest and seemingly most unimportant details should be insisted on.

Perhaps I may be forgiven if I allude briefly to our own course in elaboration of the above paragraph. In it, the aspects emphasized are morphology, including anatomy and histology, and systematic botany. The unifying interest is provided by the concepts of evolution, physiological function and ecology.

The course begins with an introduction to the unspecialized cell. It is presented as a living creature to which the functions of life are necessary. Its form and structure are studied. By their own experiments, and from the accounts of work of earlier investigators, the students study to understand its life processes—the intake of water and food materials, turgor, plasmolysis, food manufacture, storage, digestion, respiration, assimilation and growth, excretion and reproduction by mitosis.

In the rest of the course they obtain a picture of the plant kingdom composed of these cells, which specialize and coöperate more and more as we pass from lower to higher plants. Blue-green algæ and bacteria are even more simple than the cells originally studied, but show some development from lower to higher forms. Green algæ illustrate the development of sex and the reduction division, and the progress of specialization from simple, animal-like, unicellular plants to the point where multicellular plants replace cell colonies. In red and brown algæ are found somewhat more complex developments.

Fungi have modifications enabling them to follow their source of food supply. Mosses and liverworts show various primitive methods of coping with dry land conditions. Pteridophytes have gone much further, developing large sporophytes with highly specialized organs and tissues which in turn are studied in detail. Gymnosperms again illustrate many advances, and in Angiosperms we have the acme of ecological specialization, with corms, bulbs, rhizomes, fruits, variously modified roots and leaves, hairs, fibres, stone cells and the other specializations so valuable in pharmacognosy. After studying in detail the parts of a complete hypogynous flower in connection with an Angiosperm life history, the numbers and arrangement of parts in various families are investigated in the laboratory, in supposed phylogenetic order and with ecological adaptations in mind. Other organs and their tissues are studied similarly.

In the laboratory the material studied is for the most part such as has been treated generally in the lectures, the students being encouraged to see and record details additional to those previously mentioned. Some botanists have concluded that the time spent on laboratory drawings is largely wasted, and have overcome this supposed weakness by presenting their students with more or less conventionalized drawings to label. With this we are not in agreement. Botany and the allied subjects present a unique opportunity for training in precision of observation and record, in that no two plants or plant parts are found to be exactly alike. This opportunity is lost unless accurate drawings are insisted on.

To train a student to draw with scientific rather than artistic accuracy is often most difficult. His impulse, on being presented with a section for example,

is to make a record of the impression he obtains from it, rather than a scientifically accurate record of its details. For illustration two drawings from a transverse section of *Hydrastis* root will serve. Figure 1 (*A*) is a type of drawing to be persistently discouraged. The student, in attempting to reproduce artistically his impression of the section, draws immense numbers of irregular ovals. If he is an artist, which few are, he succeeds in his aim, without accurately recording, and probably without accurately seeing, anything. After perhaps the twentieth cortical cell has been drawn, he has hypnotized himself into a sort of pleasant Nirvana where his mind lies quiescent while his hand automatically proceeds, making oval after oval until the space is filled. From the standpoint of scientific training or mental improvement, fully ninety per cent of his time has been agreeably and industriously wasted. Figure 1 (*B*) is a drawing of much greater value—an outline diagram, as nearly like a camera lucida outline of that particular section as he can possibly make it, followed by equally accurate, enlarged drawings of a few cells carefully selected from each particular tissue. The second record, conscientiously done, requires as much time as is ordinarily devoted to the first, but every second of that time has added to his capacity for accurate observation and record, so that by the time his course is finished, he has acquired a portion at least, of the patience, care and accuracy so essential to real success in his profession.

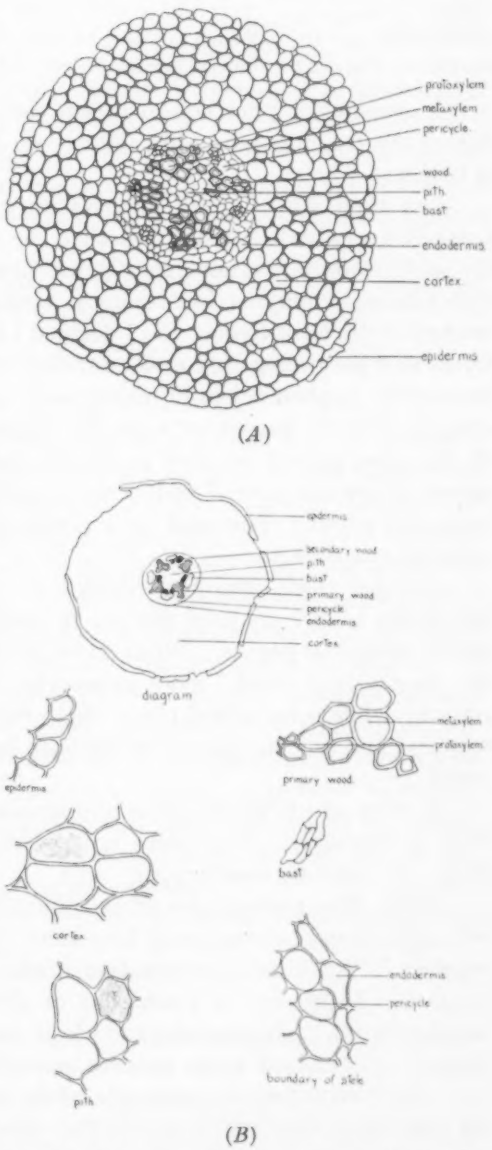


Fig. 1.—Two types of record from a transverse section of the root of *Hydrastis canadensis*.

(*A*) A type of record to be discouraged.

(*B*) A more satisfactory drawing from the same section.

In conclusion, our discussion may be summarized by saying that in the course in botany we should aim, not only to supply necessary facts to those who may specialize in pharmacognosy or allied subjects, but also to provide a training for all, in methods of thought and action that will increase their usefulness in whatever branch of their profession their lot may be cast.

SOME NOTES ON PHARMACOGNOSY.[1]

BY RALPH BIENFANG.

"Probably the term 'Pharmacognosy' will never be interpreted exactly the same in all colleges of pharmacy. Your Editor believes that we are coming nearer a uniform interpretation of this term, and the following notes on Pharmacognosy by Professor Ralph Bienfang will aid in arriving at that desired uniform interpretation."—C. B. JORDAN, *Editor*.

I present for your consideration certain problems that have confronted me during my teaching, and after telling you how I met them, see whether you agree or disagree.

One time, while in our Botany library completing my notes on certain plants, I asked a graduate student whether the department had a book on synonyms. He said, "Surely, we have the 'Index Kewensis.' " I told him that I probably didn't mean synonyms, but common names instead, because what I wanted was a book of the type of Lyons. So I decided I had been rather careless in using the two terms and now have this understanding of them. A synonym is an incorrect or incorrectly applied scientific name, as a new name applied to a species or genus already properly named, or a specific name pre-occupied by that of another species of the same genus; so used in the system of nomenclature in which the correct names of certain natural orders are regarded as determined priority. A common name is a popular term used to designate any of the members of a group of similar organisms or objects.

Another thing that has troubled me is the term "medicinal-plant." Few of our plants to-day are used directly in medicine, so I wonder if they should still be called medicinal plants. What most of them actually do, is furnish a drug. Is not then "drug plant" more appropriate? Whereas one might have a difficult time to define a medicinal plant, the term "drug" has been defined by law in this country, and a "drug plant" would then be a plant which may furnish one or more drugs.

A term which seems rather ambiguous is—"vegetable drug;" literally, a drug from a vegetable. Vegetables are specific things to-day, so I wonder if "plant drug" wouldn't be more proper.

With these remarks for an introduction, I now enter into a subject which has commanded my interest for a long time—the interpretation of the word "pharmacognosy." Such an interpretation might be attempted through an etymological analysis. However, "a knowledge of drugs" is not very specific in the face of another word, "pharmacology," whose rendering etymologically is "discourse of drugs." Let us look to the past for an explanation.

The word pharmacognosy entered the literature in 1815 presumably as a synonym for materia medica, which was at that time a study of crude drugs from the animal, vegetable and mineral kindgoms. However, in the middle of the 19th century, exclusion of the drugs from the mineral kingdom was brought about through the advances made by chemistry. This exclusion can well be approved since it left pharmacognosy a biological science instead of a mixed one. Still were this precedent to be followed with regard to plant and animal drugs, there might soon be no such subject as pharmacognosy.

[1] Delivered before the Teachers' Conference on Materia Medica, Toronto meeting, 1932.

Looking at the past, it might be concluded that pharmacognosy was a study of crude drugs of plant and animal origin. I would like, however, to suggest that in the past, though crude drugs were studied in pharmacy schools, it was not because they were crude drugs but because they were the simple drugs of that time. An interpretation of this sort welcomes the advances made in chemistry in isolating definite chemical compounds from crude animal and plant drugs.

I propose a definition for pharmacognosy based on the needs of students of pharmacy. I feel that there has always been, and is now, a definite need for a subject which will acquaint and familiarize the pharmacy student with the simple drugs used in medical practice. It then becomes a fundamental subject which besides other things fortifies the man behind the prescription counter against possible error in handling simple drugs.

The interpretation I propose is—"pharmacognosy is the history of simple drugs derived from contemporary plants and animals."

CAPPER-KELLY FAIR TRADE BILL.

Senate bill 497 and H. R. 3677 define the intent of anti-trust laws as to certain agreements. Indications are for enactment of this legislation which provides "that nothing in the Clayton Act shall be deemed to prevent a grocer, producer or dealer selling goods identified by a special brand name or trade-mark of which he is the owner from specifying by agreement with distributors the re-sale price of such identified merchandise, which prices stipulated in any such agreement shall be uniform to all distributors in like circumstances, differing only as to the quantity of such merchandise sold, the point of delivery and the manner of settlement."

The Supreme Court of the United States recently handed down an opinion in which it is held that a coöperative enterprise otherwise free from objection, which carries with it no monopolistic menace is not to be condemned as an undue restraint merely because it may affect a change in market conditions where the change would be in mitigation of recognized evils and would not impair but rather foster fair competitive prices. The opinion stresses that there must not be unreasonable restraint of trade or an attempt to monopolize.

There seems to be a growing approval of removing trade restrictions and at the same time establishing uniformity in prices.

Along with a special "150th Anniversary Supplement" (1783–1933), the *Glasgow Herald* has issued a reproduction of the first issue on January 27, 1783, of its precursor, the *Glasgow Advertiser*. Among its eleven advertisements there are two of pharmaceutical interest. One of them is by the widow of a gardener to the College, who offers medicinal herbs of all kinds and distilled waters of cinnamon, peppermint, pennyroyal, mint and hyssop, with an N. B. that she has already begun to sell herb ale as formerly during the season, and J. Gillies, bookseller, above the Cross, announces that he is sole agent for Essence of Peppermint, by His Majesty's Royal Letters Patent, prepared by J. Juniper, Nottingham, an "elegant preparation" for the "immediate" relief of "gouty and cholicky pains in the stomach and bowels, low headache and all disorders arising from wind." It is said to "recommend itself to all families and travellers by land and sea," and the public are warned against "base counterfeits." We learn from other sources that at this period nearly all proprietary medicines were sold in Glasgow by booksellers and stationers. From—*Pharmaceutical Journal & Pharmacist.*

PROCEEDINGS OF THE LOCAL BRANCHES

"All papers presented to the Association and Branches shall become the property of the Association with the understanding that they are not to be published in any other publication prior to their publication in those of the Association, except with the consent of the Council." —Part of Chapter VI, Article VI of the By-Laws.

ARTICLE III of Chapter VII reads: "The objects and aims of local branches of this Association shall be the same as set forth in ARTICLE I of the Constitution of this body, *and the acts of local branches shall in no way commit or bind this Association, and can only serve as recommendations to it.* And no local branch shall enact any article of Constitution or By-Law to conflict with the Constitution or By-Laws of this Association."

ARTICLE IV of Chapter VII reads: "Each local branch having not less than 50 dues-paid members of the Association, holding not less than six meetings annually with an attendance of not less than 9 members at each meeting, and the proceedings of which shall have been submitted to the JOURNAL for publication, may elect one representative to the House of Delegates."

Reports of the meeting of the Local Branches shall be mailed to the Editor on the day following the meeting, if possible. Minutes should be typewritten with wide spaces between the lines. Care should be taken to give proper names correctly and manuscript should be signed by the reporter.

BALTIMORE.

The March meeting of the Baltimore Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held at the Hotel Emerson on March 23rd. President Solomon introduced the speaker of the evening, Dr. John Glassford, Chief Chemist of McCormick and Co., Inc., of Baltimore, who delivered a paper, illustrated by stereopticon and moving pictures, on the subject of "Spices, U. S. P. and Others."

Dr. Glassford enumerated the spices or spice oils official in the U. S. P. X, those recognized in the National Formulary and mentioned other spices of commerce, including herbs and leaves.

The definition of a spice of the Food and Drug Administration was quoted and the general sources of spices were reviewed. Most spices come from the Asiastic tropics; Africa furnishes cayenne pepper, however; the West Indies, allspice and nutmeg and the temperate zones of Europe and Asia, mustard and the fruits of the Umbelliferæ, such as coriander, cummin and caraway seed.

The interesting and romantic history of the spice trade was reviewed. These ancient articles of commerce played an important part in the discovery of America. Marco Polo and his brother Nicoli first penetrated to the source of the spices of the Far East, and it was Marco's account of his travels that inspired the mind of Christopher Columbus to look for a shorter passage to the East Indies by way of the western ocean, which adventure, though a failure in its primary object, led to the greatest geographical discovery in history.

The volume of trade in spices was discussed. Thirty-one million pounds of black and white pepper are consumed annually by the people of the United States; twenty-two million pounds of mustard and smaller amounts of other spices down to 800,000 pounds of celery seed.

The adulteration of spices was discussed and the beneficial effect of the passage of the Pure Food and Drugs Act of 1906 mentioned. Attention was called to the fact that the Federal definitions and standards for spices and other food products formulated in the enforcement of the Foods and Drugs Act are not high standards but minimum quality standards, protecting the public from adulteration only.

The medicinal and culinary uses of spices were mentioned, including the use of mustard as a counter-irritant and emetic; oil of cloves as a local anæsthetic and ginger as a stimulant and carminative.

The natural orders furnishing spices were enumerated; the Laurineæ furnish cinnamon; the Myrtaceæ, cloves, allspice and bay leaves; the Cruciferæ, mustard; the Myristicaceæ, nutmeg and mace; the Piperaceæ, pepper; the Scitamineæ, ginger and cardamon; the Solanaceæ, capsicum; the umbelliferæ—the so-called seeds such as caraway, fennel, coriander, anise, dill and cummin and the Labiatæ, the herbs such as thyme, sage, marjoram, savory, etc.

The individual spices were then reviewed, including Ceylon cinnamon, cassia cinnamon, cloves, nutmeg, ginger, pepper, capsicum, allspice, mustard, mace, fennel, caraway and cardamon seeds.

At the conclusion of Dr. Glassford's address many inquiries were made by those present regarding points made in the paper. A rising vote of thanks was extended Dr. Glassford for his excellent paper.

APRIL.

The April meeting of the Baltimore Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held at the Hotel Emerson on April 7th.

The meeting was devoted to the annual debate between the Debating Teams of the University of Maryland School of Pharmacy and the Philadelphia College of Pharmacy and Science.

The meeting was opened by President Solomon and the visiting team was welcomed by Dean DuMez of the School of Pharmacy, University of Maryland.

The topic for debate was:

Resolved, that the Centralization of Medical Aid would be beneficial to the medical and pharmaceutical professions. The Maryland team upheld the negative side of the question and the Philadelphia team the affirmative. The team of the Philadelphia College of Pharmacy was composed of Frederick Else, Frank P. Kelly and Sidney M. Doroshaw. The Maryland team, Anthony Mentis, Frederick Tasowsky and Harry Mitnick. The judges were Messrs. Clarkson, Bacon and Baker of Baltimore.

The judges were unanimous in their decision in favor of the arguments of the Maryland team.

Approximately one hundred members and guests attended the meeting. Many students from the School of Pharmacy and a large number of retail druggis's and a few physicians were present. It was particularly gratifying to the officers of the Branch to see such a fine attendance. President Solomon is making every effort to interest students of pharmacy in the local meetings and his efforts are eminently successful.

C. JELLEFF CARR, *Secretary-Treasurer.*

CHICAGO.

The 212th meeting of the Chicago Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held on Tuesday evening, March 21, 1933, at the University of Illinois College of Pharmacy, 715 S. Wood Street, Chicago.

The speaker of the evening was Anton Hogstad, Jr., Director of Pharmaceutical Relations for the Merck Company of St. Louis. His subject was "Some Present and Future Aspects of American Pharmacy."

Mr. Hogstad began with an outline of his idea of terminology. He does not tolerate the use of the phrase "professional pharmacy." He claims that the word "pharmacy" denotes a profession without the qualifying adjective. He does not distinguish between pharmacy and commercial pharmacy, the latter he would call patent and drug merchandising.

Throughout his discussion we could plainly see that he is a firm believer that we have unlimited opportunities in pharmacy to-day. An example was cited of a druggist, a man of his own convictions, who started a drug store in a rather small town in 1917 and has built up a prescription practice that averages 125 prescriptions a day with an average net profit of 68¢ on each prescription.

Mr. Hogstad continued: "We should interest the doctors. What do we as druggists have to offer that the other druggist does not have? Druggists must be clean, as a summary shows that customers will avoid certain stores on account of such an item as the dirty finger nails of a clerk. Instances were cited of poor work on the part of the pharmacist and complaints on the part of the physician.

"Surveys show that a few of the stores are filling most of the prescriptions. Dean Arny claims that the prescription business can be doubled in the next ten years. We can educate the dentists to write prescriptions. We must increase our prescriptions if we wish to keep abreast of the times.

"As druggists we should be able to assist the doctor in dietary questions, urine analysis and other routine work that most doctors are not at present depending upon us for."

Mr. Hogstad suggests the return of the insignia of the pharmacist, the colored show globes. Large manufacturers exploit their trade-marks, why should we not exploit ours? Many pharmacists sell their most valuable spot, the picture of the character within, for a carton of cigarettes. This sign is probably the same sign that will be found in beer parlors and pool halls. This is not originality.

Many interesting hints were given that would stamp a druggist as being original. Examples were cited of showing doctors that you mean business, of unique services, prompt delivery on prescriptions, all of which stimulate the sort of business that produces real dividends for the druggist.

Lantern slides were shown of some of the outstanding drug stores which were built up by the practice of pharmacy.

The very interesting discussion was followed with questions from the large gathering and concluded with a rising vote of thanks to Mr. Hogstad.

LAWRENCE TEMPLETON, *Secretary.*

DETROIT.

The March meeting of the Detroit Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held March 16, 1933; dinner preceded the meeting.

In the absence of President Robert Fleisher, the meeting was called to order by the second vice-president, Miss Eugenia Lemke. The minutes of the previous meeting were read by the secretary and approved.

Miss Lemke asked Dean R. T. Lakey to introduce the speaker of the evening, Chairman Anton Hogstad, Jr., of the Executive Committee of National Pharmacy Week. The speaker said there is no such thing as commercial pharmacy and pleaded with the pharmacist of to-day to clean up the back room and practice pharmacy. He told the pharmacists that if like generous displays were devoted to pharmacy as to unrelated items a much healthier condition would obtain. In many instances full windows are given over to cigarettes which are sold at dealers' cost in the chain stores; he contended that it did not require salesmanship to sell cigarettes at 10¢ a package.

A general discussion followed, led by Leonard A. Seltzer, Wilbur L. Scoville, E. R. Crandall, Joseph Burniac, J. H. Webster and R. T. Lakey.

Mr. Webster spoke for the activities of the U. S. P. and N. F. Propaganda Committee of the N. A. R. D.

Chairman Hogstad completed the program by answering many questions regarding the future of pharmacy to the satisfaction of all and with assurance that pharmacy would survive and prosper if pharmacists practiced pharmacy and forgot competitive lines that are unrelated.

Miss Lemke asked for a rising vote of thanks to the speaker for giving the members an interesting and profitable evening—it was enthusiastically given.

BERNARD A. BIALK, *Secretary.*

NEW YORK.

The March meeting of the New York Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held on Monday, March 20th, at the New York College of Pharmacy, Columbia University. Vice-President, Dr. Charles W. Ballard was in the chair. Approximately one hundred and twenty-five members attended. The report of the secretary was read and approved.

Chairman Lehman of the Committee on Education and Legislature reported on the progress of legislation in the New York Legislature: Assembly Bill 734, Int. 706 (Coughlin); Senate 437, Int. 436 (Crawford), make it illegal for hospitals or clinics, supported wholly or in part at public expense, to receive fees for services. A companion bill provides a Central Board of Control over charitable institutions giving free treatment. This is favored by the State Association, New York Pharmaceutical Conference and Locals.

Assembly 1243, Int. 1150 (Schwartz), requires the labeling of all medicinal preparations, giving the quantities of all ingredients. This bill is opposed by the State Association.

Assembly 1593, Int. 1458 (Gimbrone); Senate 1118, Int. 1056 (Twomey) amends the educational law requiring every pharmacy to be under the supervision of a registered pharmacist when open for business and regulates the hours of service of registered employees. This has the support of the State Association.

Assembly Bill 1552, Int. 1424 (McNamara); Senate 11–5, Int. 1043 and Assembly 401, Int. 395 (Dickey). Senate 798, Int. 772 (Feld) represent narcotic legislation in line with the so-called uniform narcotic law.

One reason for opposition is that it includes Cannabis, also, it is thought that in case of prosecution the matter should first be submitted to the Board of Pharmacy, before official prosecution.

Assembly Bill 346, Int. 345 (Neustein), Senate 688, Int. 673 (Feld), provides for the conduct of pharmacies in cities of a million or over. Bills have been introduced for liquor control and the selling of beer.

Assembly 103, Int. 103 (Canney) provides for taxes on chain stores, as follows: From three to not exceeding ten stores, $15.00 each; over ten, not exceeding twenty, $20.00; each additional store in excess, $25.00. Assembly 187, Int. 187 (Condon) is also a chain store tax bill and on this the State Association is neutral, but is inclined to favor them.

Assembly 661, Int. 633 (Gimbrone) known as anti-discrimination bill makes it illegal for establishments to charge varying prices for the same commodity in its different stores. This bill is favored by the State Association. Assembly 662, Int. 634 (Gimbrone) is similar to the Junior Capper-Kelly Bill of California and is favored by the State Association.

Assembly 666, Int. 638 (Gimbrone), Senate 430–833, Int. 426 (Toomey), places the control of the sale of medicinal preparations containing poisonous, deleterious or habit-forming drugs, under control and supervision of the State Board of Pharmacy. This is favored by the State Association and was carried in the Senate on March 15th.

Chairman Herbert C. Kassner reported on the enlarged Membership Committee and submitted two names for membership, Charles H. Thomas and Cosmo Ligorio. They were elected members of the Branch.

Dr. C. W. Ballard introduced as the first speaker of the evening, Dr. George T. Pack, a cancer specialist connected with the Memorial Hospital in New York, who spoke on "Cancer."

He introduced his subject by asking the question, "What Is Cancer?" He said: "Cancer is a lawless growth of body cells which destroys the life of the person in whom it grows if allowed to run its course. The cancer cells grow at a more rapid rate than the normal cells of the organs, and are not controlled by the laws which keep the growth of normal cells within proper limits. Eventually minute parts of the original cancer growth may break off and be carried in the blood vessels to other parts of the body, where they may start secondary growths. This fact is responsible for the erroneous belief of the laity that cancer is a blood disease. Cancer can be cured in its early stages by the judicious use of surgery, X-ray or radium, as indicated by the nature of the particular cancer."

Dr. Pack stated that cancer is on the increase throughout the world and gave statistics; no nationality or race is immune. He believed that cancer is not inherited but families in which cancer has appeared should be watchful of irritations and infections. He said observations prove that an individual is as old as his oldest tissue or organ and that all tissues do not have the same rate of decay. Although cancer may grow in young people, it is usually a disease of middle or older life. He spoke of symptoms which should prompt a person to consult a physician. Almost every food had been blamed for cancer, however, in his opinion it was quantity of food rather than food of a particular type which was responsible; cancer is not contagious, it is not a germ disease; pre-cancerous conditions are not cancerous although they indicate cancerous possibilities. He referred to moles and growths which are subject to frequent irritation.

Dr. Pack said that cancer more frequently appears on the lower lip than on the upper lip. Lip cancers are predominant in men, particularly pipe smokers, possibly due to the application of heat and the pressure of the pipe stem and the irritation caused by tobacco is also responsible. While the tobacco habit is almost universal, the relative proportion of attributable cancers is comparatively small; however, it is significant that cancer appears in places that are affected by smoking. He recognized the futility of preaching the dangers of cancer on account of tobacco. Cancer within the oral cavity is more frequent in men.

He emphasized the necessity of regularly consulting the dentists, and brought out a number of danger signals. Among his admonitions are the following:

"Every mother should have a routine examination by her doctor three months after the birth of each of her children. At this time, necessary repairs to childbirth injuries can be made. Every woman should seek the counsel of her physician, at the appearance of any unusual discharge or any abnormality of menstruation. At the menopause or change of life and at various subsequent intervals, complete examinations are essential for future self-protection. Be advised now that the reappearance of a discharge after the menopause of 'change of life' has become fully established, may be a sign of possible serious import.

"Cancer is admittedly more frequent in women than in men. The predisposition of the uterus or womb, ovaries and female breasts to cancer, accounts for this difference and confirms the need for constant personal surveillance and frequent examination of these organs.

"A lump in one's breast is an unfriendly companion to tolerate. The kind that is painless is particularly dangerous because of the false sense of security.

"About fifty per cent of patients applying to a cancer clinic for treatment of cancer of

the rectum, attributed the bleeding which they had observed for some time to hemorrhoids or piles. Here is the danger of self-diagnosis. Every patient with this complaint is entitled to an examination to verify the source and cause of bleeding. If this plan were universally followed many early rectal cancers would be discovered and cured.

"Once the diagnosis of cancer is made or even when it is suspected, the confirmation of the diagnosis and the subsequent plan of treatment should be in the hands of those who have some degree of familiarity with this work."

Dr. Pack concluded by saying that cancer causes will decrease when persons more frequently consult the doctor and the dentist for periodic examinations.

Dr. Arthur H. Estabrook, of the American Society for the Control of Cancer, was next introduced. He discussed the research work being carried out on animals and isolated animal tissues in the study of cancer. He referred to the fact that pieces of heart tissues of chicks had been kept alive in proper media for about thirty years and thus made use of in studying the growth and properties of living animal cells.

The Canti film, an extremely interesting scientific film, was explained by Dr. Estabrook. This shows a growth of animal cells and cancerous cells *in vitro* and the effect of radiations on both animal and cancerous cells demonstrated.

Another experiment which has been possible is to determine the maximum amount of radium radiation the animal cells will withstand. It was found that cancer cells do not possess as high a resistance and that radium radiation could be used to destroy some cancerous cells and not affect the animal cells. He stated that cancer had been found among dogs, cattle, horses and monkeys, and also among insects and fish; and certain conditions in plants are apparently a cancer-like growth. He said that cancer is a definite biological process. In some cases the vital organs of the body are completely replaced by cancerous tissues and death results from such replacement. He stated that cancer research is practically at its beginning. In conclusion, Dr. Estabrook pointed out various ways in which the pharmacist can be of help in giving information to the public by keeping the patient away from quacks and fake cancer cures. He referred to publications issued by the American Society for the Control of Cancer, which supplies useful information. The titles of the booklets are, "What Every One Should Know about Cancer;" "Here Are the Danger Signals for Cancer;" "Prevention of Cancer." Pharmacists can secure copies for free distribution.

It was brought out in the discussion that cancer can be artificially produced by the use of certain chemicals. A hydrocarbon present in water has been isolated, which has the property of causing cancer. A vote of thanks was given the speakers.

RUDOLPH HAUCK, *Secretary.*

NORTH PACIFIC BRANCH A. PH. A. ORGANIZED.

Charter members of the North Pacific Branch, A. PH. A. include the following: Earl Gunther, George W. Steehammer, E. A. Robison, M. C. Kaegi, Ruth MacFarlane, Fred Grill, L. G. Haack, Frank Nau, John T. Witty, W. S. Rhodes, Fred A. Geue, Harry Weis, F. C. Felter, Harvey J. Donnell, A. O. Mickelsen, George Cornes and Holly Phipps.

Officers elected for the ensuing year are: *President*, Dean A. O. Mickelsen; *First Vice-President*, L. G. Haack; *Second Vice-President*, John T. Witty; *Secretary-Treasurer*, Harvey J. Donnell.

The organization will feature professional pharmacy only, and in coöperation with the Oregon State Pharmaceutical Association will conduct a special meeting devoted to professional pharmacy at its next annual convention.

PHILADELPHIA.

The March meeting of the Philadelphia Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held at the Philadelphia College of Pharmacy and Science on March 13th.

At this meeting a complimentary dinner was tendered the members of State Boards of Pharmacy, the visiting delegates of the Faculties of Colleges of Pharmacy in the N. A. B. P. District No. 2, and the past-presidents of the Philadelphia Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION.

The coöperation and assistance of the following firms assured the success of the occasion: The Philadelphia Wholesale Drug Company; Sharp and Dohme; Smith, Kline and French,

Incorporated; Whitall, Tatum Company; and John Wyeth and Brother, Incorporated.

Dr. Charles H. LaWall acted as toastmaster and presented the speakers. Dr. Wilmer Krusen welcomed the guests for the Philadelphia College of Pharmacy and Science. Dean H. E. Kendig represented Dr. Charles H. Beury, and spoke a word of welcome on behalf of Temple University. An inspiring message, "Shooting the Sun," was then presented as the climax to the evening's entertainment by the distinguished orator, Dr. John Dennis Mahoney.

After the dinner the members of the Local Branch assembled for a short business session and received the report of the secretary and treasurer. The annual election of officers took place, and the following officers were elected for the ensuing year: *President*, Frank H. Eby, *First Vice-President*, George A. Slothower, *Second Vice-President*, Theodore Campbell, Jr., *Secretary-Treasurer*, Edmund H. MacLaughlin, *Delegate to the House of Delegates*, Ambrose Hunsberger.

The meeting adjourned after farewell remarks by the retiring president, W. J. Stoneback, and the presentation of the new officers.

E. H. MacLaughlin, *Secretary.*

PITTSBURGH.

The Pittsburgh Branch of the American Pharmaceutical Association held its regular monthly meeting Thursday, March 23rd, in the main lecture room of the Falk Clinic, Pittsburgh. Clarence T. Van Meter presided.

The group had the pleasure of hearing J. B. Pilchard, secretary of the Pennsylvania Pharmaceutical Association, who spoke on the activities of state and national associations, in answering these two leading questions: "What has the American Pharmaceutical Association done for me?" "What can the American Pharmaceutical Association do for me?"

Mr. Pilchard indicated that the American Pharmaceutical Association is the oldest pharmaceutical society in the United States. It has contributed much to scientific research; national legislation; editing the "National Formulary," and helped to better standards in pharmaceutical education. For these and many other reasons, Mr. Pilchard stressed the necessity of coöperating and supporting this important national association of pharmacists.

He related a number of incidents pertinent to state legislation and told the group something about the method of procedure involved in sponsoring and passing effective pharmaceutical legislation.

The discussion was led by Prof. C. Leonard O'Connell. He indicated that it was gratifying to see so many pharmacists interested in building a strong local unit in Pittsburgh. In attendance were pharmacists engaged in every pharmaceutical service: Retailers, hospital pharmacists, teachers, detail men, etc. One of the chief objectives of the Pittsburgh Branch, as indicated by President Van Meter, is to destroy the old notion that the Branch meetings are solely for members of teaching staffs and those interested in professional and scientific aspects of pharmacy. The meetings of the Pittsburgh Branch of the American Pharmaceutical Association are designed for all pharmacists; pharmacists are welcome, and urged to attend.

Brought out in the discussion was the fact that no local unit should attempt to set itself up as being greater than the state or national organizations. It seemed best that no attempt be made to sponsor legislation or any activity unless it is directed through the channels of the state and national societies.

After the meeting was adjourned the Pharmacy of the Falk Clinic was inspected. It was a unique experience to learn something about the specialties of hospital pharmacy.

Frank S. McGinnis, *Secretary.*

PITTSBURGH STUDENT BRANCH.

The March meeting of the Pittsburgh Student Branch of the American Pharmaceutical Association held March thirty-first was called to order by Dr. O'Connell, who, after a few comments placed the meeting in charge of the president. The president introduced Mr. Thiel who gave a complete report on the meeting of the Pittsburgh Branch of the American Pharmaceutical Association held March twenty-fourth at the Falk Clinic. The secretary then presented, for the approval of the student body, a set of resolutions which stand as corrected:

1. *Resolved*, that a Pittsburgh Student Branch of the American Pharmaceutical Association be maintained each following year.

2. *Resolved*, that officers for each year be appointed as follows: *President*, Delegate of the Senior Class; *Vice-President*, Delegate of the Junior Class; *Secretary*, Delegate of the

Sophomore Class; *Treasurer*, Delegate of the Freshman Class.

3. Resolved, that Student Branch meetings be held monthly.

4. Resolved, that meetings be open to the entire student body.

A. To familiarize the lower classmen with the organization.

B. To secure their enthusiasm.

C. To create a desire for membership.

5. Resolved, that membership be open to Junior and Senior class members.

6. Resolved, that prior to each student meeting a delegate meeting be held.

7. Resolved, that a delegate and an alternate delegate to the National Convention be elected by the Junior class and be presented at the last open meeting for the approval of the entire student body.

8. Resolved, that the last meeting of the school year be in the form of a joint meeting and banquet with the Pittsburgh Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION, and a man interested in the field be secured as the speaker.

After the reading of the resolutions, Mr. Gabig, the delegate of the Junior class, presented Mr. Lee, the delegate to the National Convention, who expressed his gratitude and pledged his coöperation. The necessity for an alternate delegate to the convention was stressed by Dr. O'Connell, and upon a motion Mr. Gabig was appointed to fill this position. Mr. Zalevsky, the main speaker of the meeting, gave a very interesting talk on, "Pharmacy of the Middle Ages." The speaker brought out some interesting facts concerning the Materia Medica of the middle ages. After a brief open forum the meeting was dismissed.

GREYSON P. LEWIS, *Secretary*.

UNIVERSITY OF WISCONSIN STUDENT BRANCH.

A special meeting of the University of Wisconsin Student Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held February 17th, in the Chemistry Building of the University of Wisconsin. President Vosmek presided. President-Elect Robert L. Swain of the A. PH. A. was presented and congratulated the members. He spoke of the opportunities of pharmacy and encouraged the students to carry on in pharmaceutical education and development. He stressed the necessity of full appreciation of the responsibilities of pharmacy.

Secretary E. F. Kelly was introduced and spoke in an encouraging way of the progress of pharmacy and the work that the A. PH. A. is doing in its promotion and its coöperation with various state and national organizations. He said that Student Branches were helpful in these efforts because thereby the pharmacists are made acquainted with the purposes of pharmaceutical organizations.

Indicative of the relative importance of pharmacy in medical care, it was explained that in the pharmacies of the United States about 250 million prescriptions are filled annually, corresponding approximately to eight prescriptions per second, and that 715 million dollars' worth of pharmaceuticals are sold annually, not including medical supplies which is about one-fifth of the total amount paid for medical care in the United States.

He extended best wishes for the Student Branch and stated that its members were of great assistance through the support given to the work of the AMERICAN PHARMACEUTICAL ASSOCIATION.

Dr. Edward Kremers thanked the speakers for their addresses and spoke of the opportunities afforded by the annual meetings to become acquainted with the pharmacists of the country.

At a meeting held February 22nd, by the Wisconsin Student Branch of the A. PH. A., the following officers were elected for the ensuing year:

President, George Vosmek, Antigo; *Vice-President*, George I. Schefelker, Stoughton; *Secretary*, Norman Glander, Manitowoc; *Treasurer*, Arnie Stensby, Stoughton; *Advisor*, Edward J. Ireland.

Plans for the coming year were formulated and it is contemplated to hold monthly meetings at the Memorial Union. The Student Branch also anticipates taking active part in the Convention of the A. PH. A. The Branch will celebrate its first anniversary on the Campus and it has been sponsored by Edward J. Ireland.

At a meeting held February 16th, the following officers were elected: *President*, George A. Vosmek, Antigo; *Vice-President*, George L. Schefelker, Stoughton; *Secretary*, Norman E. Glander, Manitowoc; *Treasurer*, Arne E. Stensby, Stoughton.

At a meeting held March 7th, the group was addressed by Ralph W. Clark, who discussed

the inter-relationships of the AMERICAN PHARMACEUTICAL ASSOCIATION, the Wisconsin Pharmaceutical Association and the National Association of Retail Druggists. He pointed out the aims and ideals of these organizations and mentioned, among other things, the nearly 100,000 pages of printed material contributed by the AMERICAN PHARMACEUTICAL ASSOCIATION; the state legislative work of the Wisconsin Pharmaceutical Association and the national legislative work of the National Association of Retail Druggists.

PHARMACY DEPARTMENT ANNIVERSARY, UNIVERSITY OF WISCONSIN.

The fiftieth anniversary of the founding of the Department of Pharmacy at the University of Wisconsin was celebrated April 19th. Prominent speakers were on the program of the afternoon and evening meetings. They included deans of the colleges of pharmacy of Illinois, Indiana, Iowa, Michigan and Minnesota, as well as Dr. Edward Kremers and President Glenn Frank of the University of Wisconsin. A banquet was held at 6:30 P.M. Druggists, alumni and friends of the Wisconsin Department of Pharmacy were in attendance. Members of Rho Chi, the student branch of the AMERICAN PHARMACEUTICAL ASSOCIATION and the faculty coöperated in making the occasion a success.

Prof. Edward H. Plogman recently spoke before the Cincinnati Branch of the A. PH. A. on "What Has Happened to Prescription Writing?" He referred to the coöperation of pharmacists and physicians of an earlier day which does not obtain to that extent at the present time. He also cited the present drug store as partly responsible for lack of this coöperation. He discussed counter-prescribing and in connection therewith the practice of many physicians in supplying medicines to the patient. His conclusions were that in the medical colleges more attention should be given to prescription writing and a greater appreciation instilled relative to the preparations of the U. S. P. and the N. F.

RHO CHI INITIATION.

Delta Chapter of Rho Chi (Iowa) initiated four students and three alumni, March 17th. The Chapter requires that student members prepare a paper on some subject of pharmaceutical interest. Preceding the induction ceremony each student presented a brief abstract of his paper.

The new student members are: Karen A. Norgaard, '34, Iowa City; Robert H. Dreyer, '33, Aplington; Irvin V. Wolf, '33, Burlington, and Wendell H. Boylan, '33, Hubbard. Miss Norgaard, who ranked highest of the group, was also recently elected to Iota Sigma Pi, honorary chemical sorority. Alumni elected were August F. Koch, '97, and F. William Miller, '00, both of Amana, and Edward S. Rose, '04, Iowa City.

Following the initiation at the College, a dinner was given at Youde's Inn in honor of the new members. Those in attendance included other undergraduate members, members who are graduate students and staff members. Prof. R. A. Kuever acted as toastmaster. Lloyd H. Bowman, '34, president of Delta Chapter, welcomed the new members; Miss Norgaard gave the response for the students and Mr. Rose for the alumni. The "History of Rho Chi" was given by Professor Zada M. Cooper. Dean Wilber J. Teeters closed the program with a talk on "Scholarship Character and Personality."

PARACELSUS LIBRARY.

A recent brochure of The Hahnemann Medical College of Philadelphia, dated 1932, contains a twleve-page description (pages 7 to 18) of the collection of the works of Paracelsus (1490–1541) which belonged to the late Dr. Constantine Hering and is now the property of the College. The works of Paracelsus are of deep interest to the student of the history of chemistry. Dr. Hering collected 189 volumes of the original works, commentaries and translations.

His collection also includes a number of pamphlets by or about Paracelsus. It is especially rich in editions of the 16th and 17th centuries. A copy of the brochure has been donated by Dean W. A. Pearson.

EDITORIAL NOTES

Editor: E. G. Eberle, 10 West Chase Street, Baltimore, Md.

Members of the Council, A. PH. A.: S. L. HILTON, *Chairman;* CHARLES H. LAWALL, *Vice-Chairman;* E. F. KELLY, *Secretary;* H. V. ARNY, A. G. DUMEZ, H. A. B. DUNNING, WILLIAM B. DAY, C. E. CASPARI, J. H. BEAL, T. J. BRADLEY, AMBROSE HUNSBERGER. *Ex-Officio Members:* W. BRUCE PHILIP, *President;* ROWLAND JONES, G. H. GROMMET, *Vice-Presidents;* C. W. HOLTON, *Treasurer;* E. G. EBERLE, *Editor of the Journal;* A. G. DUMEZ, *Editor of the Year Book;* J. W. SLOCUM, *Chairman of the House of Delegates.*

Collaborators: The Members of the Council; E. FULLERTON COOK, *Chairman,* U. S. P. Revision Committee; E. N. GATHERCOAL, *Chairman,* N. F. Revision Committee; Chairmen of the Sections, A. PH. A.: W. J. HUSA, W. J. RIVARD, W. PAUL BRIGGS, LEON MONELL, LOUIS GERSHENFELD, CHARLES H. STOCKING, *President,* A. A. C. P.; CHARLES B. JORDAN, *Chairman,* Executive Committee, A. A. C. P.; CLARE F. ALLEN, *President,* N. A. B. P.; HENRY C. CHRISTENSEN, *Secretary,* N. A. B. P. Scientific Section—Board of Review on Papers: *Chairman,* L. W. ROWE, Detroit, Mich.; JOHN C. KRANTZ, JR., Baltimore, Md.; F. J. BACON, Cleveland, Ohio.

LET US ASSIST YOU IN SOLVING PRESCRIPTION PROBLEMS.

Dr. S. L. Hilton, former President of the AMERICAN PHARMACEUTICAL ASSOCIATION and Chairman of its Council, well and favorably known pharmacist of Washington, will answer problems that come up in prescription practice. We, therefore, invite those who have problems to send them to this office at 10 W. Chase St., Baltimore.

A correspondent asks for a formula containing zinc oxide, boric acid, menthol, bismuth and eucalyptol, lanoline and white vaseline.

Dr. Hilton suggests the following:

Menthol	8.0
Eucalyptol	33.0
Bismuth subnitrate	100.0
Boric acid	100.0
Lanolin, hydrous	100.0
Zinc oxide	100.0
White vaseline	559.0

Make an ointment.

PHARMACEUTICAL INSTITUTE, UNIVERSITY OF BERNE.

A reprint has been published by Prof. Dr. A. Tschirch, describing the new Pharmaceutical Institute of Berne University, which has recently been completed. The building is erected on the wide area near the Pharmacological Institute. It is fitted for teaching as well as research and is divided into five sections, namely, (1) pharmaceutical and forensic chemistry and toxicology, (2) pharmacognosy, (3) pharmaco-anatomy, (4) galenical pharmacy, (5) the pharmaceutical central library.

The rooms are arranged on three floors. In the middle floor is the general laboratory, the laboratory for degree students and the directors and assistants' laboratories. The second floor contains rooms for microscopy lectures, laboratory, the herbarium, museum, etc. There is a photographic section, department for ultramicroscopic p_H determinations, provisions for colorimetric work, and also a laboratory for forensic analysis, etc. The east wing is occupied by a laboratory for the analysis of proprietary and secret remedies. In the courtyard a glass house for experimental cultures has been erected and ground is available for the laying out of the medicinal plant garden.

Dr. Tschirch is an honorary member of the AMERICAN PHARMACEUTICAL ASSOCIATION.

SODIUM SALT OF BARBITURIC ACID DERIVATIVE AS NEW ANESTHETIC.

Ernst points out that, although the methods of general anesthesia applicable in clinics and hospitals have been greatly improved in recent years, the physician in general practice, particularly in emergency surgery, is still at a disadvantage. Recently a sodium salt of a barbituric acid derivative has been prepared and found to produce a satisfactory short general anesthesia. Tests revealed that the intravenous injection of 10 cc. of a 10 per cent

aqueous solution of the sodium salt is the best method of application.

STERILIZATION IN HOSPITAL PHARMACY.

At a meeting of Public Pharmacists, London, Mr. Davis said "it was essential to acquire some knowledge of the habits of the organisms which give rise to bacterial contamination. The ideal method of doing this was to perform simple practical experiments with culture media. An autoclave, a hot air oven and possibly a steamer should be available in all dispensaries. The use of a steamer can possibly be avoided as experience in the sterilization of culture media has shown that steaming for an hour has not succeeded in killing certain types of resistant spores. To produce sterility it would appear that steaming on three successive days is essential. The process of intermittent steaming can therefore be superseded by the official process of Tyndallization. The ideal source of heat for Tyndallization is an electric sterilizer fitted with thermostatic control. An oven of this type with totally enclosed heating elements and with a temperature range of 60° C. to 160° C. is an acquisition to any dispensary. Statistics in regard to the decomposition of chemical substances on heating and the degree of safety in the filtration methods are sadly lacking. With the continued growth of hypodermic medication more facts will probably show an advance in the preparation of sterile solutions comparable with the advance shown in the 1932 (British) Pharmacopœia—*Pharm. Jour. and Pharm.*, March 25th.

COLOR TEST FOR ROTENONE.

Howard A. Jones and Charles M. Smith (*Ind. Eng. Chem., Analytical Edition*, 5 (1933), pages 75–76) described the following color reaction of the insecticide rotenone. The test will reveal the presence of as little as 0.1 mg. of rotenone. Mix 1 cc. of the acetone solution of rotenone with 1 cc. of dilute (1 to 1) nitric acid, and let stand 30 seconds. Then dilute with 8 or 9 cc. of water, and add 1 cc. of concentrated ammonia water. A blue color is obtained, almost identical with that yielded by bromothymol blue at p_H 7.2. The insecticide deguelin, which, like rotenone, is of vegetable origin, also gives this reaction.—J. S. H.—*J. Franklin Inst.*

TABLETS IN THE NATIONAL FORMULARY VI.

The inclusion of a list of some fifty compressed and hypodermic tablets in the National Formulary VI was approved at a meeting of the Contact Committee of the American Pharmaceutical Manufacturers' Association, which was held at the Hotel Washington, in New York on March 13th–14th. Fifteen representatives of twelve member firms, organizations and government bureaus were present.

The Contact Committee also adopted a resolution recommending to all member firms that, as rapidly as new labels and cartons for ampul packages be required, the following statement be made at a suitable place somewhere on or in the unit sales package. "Each ampul contains a sufficient amount to permit withdrawal and administration of . . . . cc."

THE HOTEL DIEU DE BEAUNE.

The Hospital of Beaune, Burgundy, was founded in 1443 by one Nicolas Rolin and his wife, Guigone de Salins. In its early days syrups and herb concoctions for the patients were made locally; but, by an Act of 1484, it became necessary to go to an established apothecary for drugs. Gradually drugs and medicines became dearer, and the hospital was spending more on them than it could afford. An arrangement was therefore made with a trained apothecary, named Gremaud, that he should train two sisters as dispensers, and, later, that he should sell to the hospital the material necessary for its dispensary.

In 1501, according to a free translation from early French, all that had been necessary in the dispensary had been: "Twelve beautiful boxes of pewter to keep syrups and conserves, six little tubs full of distilled water, a hundred phials for waters, jars for conserves and honey and a little tub, some soap in another, three furnaces, mortars, round pots and pots with tails." The inventory of the material sold by Gremaud on March 22, 1789, for the sum of 1731 livres, 9 sols and 6 deniers, includes 120 pieces of old Nevers pottery (probably jars), mortars, scales, weights and counters. They may still be seen in the beautiful old dispensary which opens off the "Court of Honour" of the hospital.—From an article by E. Torrey in the *Pharmaceutical Journal and Pharmacist.*

PERSONAL AND NEWS ITEMS.

Morris Dauer, Chief Pharmacist of Kings County Hospital in Brooklyn, is doing excellent work in acquainting internes with preparations of the U. S. Pharmacopœia and the National Formulary. Recently a delegation of pharmacists were invited guests at a lecture on "Aromatics and Coloring, Their Psychological Effect and Their Importance in the Compounding of the Modern Prescription." The visitors complimented Pharmacist Dauer.

Sir Henry H. Dale, director of the National Institute for Medical Research, London, England, delivered the Dohme Lecture at the Johns Hopkins University School of Medicine, April 20th–22nd.

Sir Henry Dale, Director, of the National Institute for Medical Research, England. He delivered the Dohme lecture at Johns Hopkins, April 20th–22nd, and was the principal speaker and guest of honor at the dedication of the Merck Laboratory.

Dr. Charles A. Rogers, pharmacy staff, University of Minnesota, is recovering from appendectomy.

Dr. Perceval Sherer Rossiter has been appointed surgeon general and chief of the Bureau of Medicine and Surgery of the U. S. Navy, with the rank of rear admiral, for a term of four years. The Senate confirmed the appointment, March 16th. He is a graduate of the University of Maryland School of Medicine, class of 1895.

Oliver Kamm of Parke, Davis & Co., Detroit, and E. H. Volwiler of Abbott Laboratories, North Chicago, were among the 250 scientists who are regarded by their colleagues as among the leading workers in their fields in the United States, according to a list published in *Science*.

Dr. Frank A. Hartman, professor of physiology at the University of Buffalo and discoverer of cortin, has been awarded the Schoellkopf medal for 1933. This medal is given annually by the Western New York section of the American Chemical Society for outstanding achievement in science.

Philip B. Onderdonk, of Riderwood, Md., has been awarded a four-year graduate fellowship in chemistry at the Johns Hopkins University. The fellowship was offered by Dr. H. A. B. Dunning and carries with it $1000 a year for four years. It is a part of the National Fellowship plan at the university.

Henry Lewis, Madison's pioneer druggist, celebrated his eighty-first birthday by going to his pharmacy at 501 State Street, Madison, as he has done with few intermissions since he started the store 53 years ago.

Dr. William H. Welch, known internationally as dean of American medicine, had to undergo a surgical operation on April 17th; he has been in the hospital since February 3rd.

Dr. H. Salzmann, chairman of the Executive Committee of the German Apothecaries' Society, under date of April 3rd, advises that the reports which have been published abroad relative to cruelties and mistreatment of Jews in Germany are not founded on fact. He asks that his communication be made note of in the JOURNAL so that this misinformation may be denied and corrected.

Dr. H. C. Sherman, a pioneer worker in vitamins and enzymes, is the 1933 medalist of the American Institute of Chemists. He is now engaged in studying further the relation of food to longevity.

Dean C. B. Jordan, of the School of Pharmacy at Purdue University, Lafayette, Ind., and chairman of the executive committee of the American Association of Colleges of Pharmacy, has been on the Pacific coast inspecting the schools of pharmacy of that section.

Dr. Charles W. Henney, of Portage, Wis., is a member of the present Congress. He is an alumnus of Northwestern University Medical School.

Senate Bill 5050 by Senator Copeland, amends Section 2 of the Clayton Act, prohibiting price discrimination in interstate commerce. The Senator has also sponsored a bill against unfair price competition. It amends Section 5 of the Federal Trade Commission Act.

Dean G. L. Curry has contributed a timely article on "Barbital and Derivatives" to the *Kentucky Pharmaceutical Journal.* In it, he gives a history of Barbital and the danger of indiscriminate sales. The dean suggests that manufacturers mark Barbital packages "Not to be used except by advice of a physician" and urges physicians to insist on non-repetition of prescriptions. He also points out the duties of pharmacists in connection with its sale and dispensing.

Theodore J. Bradley presided as chairman of the Section on Pharmacopœias of the Pan-American Congress in Dallas (English-speaking). The Dallas Retail Druggists' Association entertained him at luncheon, Walter H. Cousins presided as toastmaster.

Prof. Charles C. Plitt, University of Maryland School of Pharmacy, has been in the hospital for several weeks. Conditions resulted in the necessity of amputating a leg; he is making good recovery, but it is a serious affliction. Sympathy is expressed to Dr. and Mrs. Plitt.

Harry Noonan is sailing on April 28th for Bermuda to attend the 29th District Rotary Conference.

F. H. King, of Delphos, Ohio, has been reappointed a member of the Ohio State Board of Pharmacy for his 8th consecutive term; he was first appointed in 1898. He is an honorary active life-member of the Ohio State Association, and in January of this year celebrated the 50th anniversary of his entry into pharmacy.

Mellon Institute of Industrial Research has issued a select annotated bibliography on "The Hygienic Aspect of Aluminum and Aluminum Utensils." The introduction is by **Dr. George D. Beal.**

Prof. C. P. Wimmer was elected president of the Academy of Pharmacy at the recent annual meeting. Other officers are: *First Vice-President,* **Dr. Wm. C. Anderson;** *Second Vice-President,* **Dr. George C. Diekman;** *Third Vice-President,* **Dr. J. Leon Lascoff;** *Treasurer,* **F. C. A. Schaefer;** *Secretary,* **Nicholas S. Gesoalde.**

The father of **Horace Whittlesey,** former president of the Idaho State Pharmaceutical Association, celebrated his 80th birthday recently. The son arranged a surprise dinner for the celebration. The senior is still actively associated with the Whittlesey Pharmacy and is an ardent golfer.

Mrs. Lee Stinson, wife of the Vice-President of Texas Pharmaceutical Association, has won a national prize in a garden contest. The beautiful Stinson home at Snyder, Texas, was awarded one of the fifteen prizes.

Hon. Henry T. Rainey, speaker of the House of Representatives, was honor guest at the 8th annual dinner of the Drug Chemical and Allied Trade Section of the New York Board of Trade, March 16th. The dinner was attended by more than eight hundred persons. Francis J. McDonough presided and Charles L. Huisking was toastmaster.

Pharmacist **George L. Seacord** will address a general meeting of the Irving Park Branch of the Chicago Medical Society and members of the Chicago Retail Druggists Association on May 23rd.

Wilhelm Bodemann, patron saint of Veteran Druggists, is recovering from illness extending over a week or more.

Martin Lang, pharmacist of Elwood, Indiana, has been appointed State Food and Drug Commissioner by Gov. Paul V. McNutt.

DEDICATION OF MERCK LABORATORY.

Sir Henry Dale, director of the National Institute for Medical Research of England, will be the principal speaker at the dedication of the new Merck Research Laboratory, to take place here on April 25th.

George W. Merck, president of Merck & Company, Inc., was responsible for the selection of Sir Henry, who will be welcomed by the following guests of honor: President du Pont, of E. I. du Pont de Nemours & Co., Inc.; J. K. Lilly, of Eli Lilly & Co.; and Surgeon General Hugh S. Cumming of the United States Public Health Service. Governor Harry A. Moore will represent the State of New Jersey.

OBITUARY.

LOUIS FREDERICK GREWE.

Louis F. Grewe, member of the AMERICAN PHARMACEUTICAL ASSOCIATION since 1901, died of pneumonia at his home, 2101 South Grand Boulevard, South St. Louis, aged 63 years. He had operated the drug store at that address for 24 years. For ten years previously he owned a drug store at the northeast corner of South Grand and Henrietta Avenue. Earlier, following his graduation from St. Louis College of Pharmacy, he had begun his apprenticeship in a store at 15th and Olive Streets, and had spent several years in his profession at Denver, Cheyenne and San Francisco. The deceased is survived by his widow, Mrs. Minnie B. Grewe.

John Francis Queeny, founder of the Board of Monsanto Chemical Works, died March 19th, aged seventy-four years. About a year ago he observed his sixtieth year in the drug and chemical industry and was the guest of honor at a testimonial dinner.

Franklin Pierce Weller, 78, veteran Washington druggist, died March 26th. Born in Thurmont, Frederick County, Md., of Revolutionary ancestry, Mr. Weller came to Washington as a youth. During the early 80's he served as pharmacist in the Navy, retiring to open a drug store at Eighth and I Streets, S. E.

The mother of our fellow-member, **George Decker,** died February 7th, aged eighty-one years, following an accident. We express our sympathy.

Edwin B. Rennebohm, 41, secretary and vice-president of the Rennebohm Drug Stores, Madison, Wis., died at a local hospital, March 1st, after a paralytic stroke. Mr. Rennebohm had been a drug store operator in Madison almost continuously since 1914 and was prominent in civic and business affairs. He was a member of the Gyro Club, the Masonic order and active in work of his church, and the Wisconsin Pharmaceutical Association.

SOCIETIES AND COLLEGES.

CALL OF THE SECTION ON HISTORICAL PHARMACY.

The Section on Historical Pharmacy is desirous of having contributions for its program at the Madison meeting. Those states that have not completed their histories are invited to do so as early as possible so that the completed histories of all states can be coordinated. Each state has outstanding pharmacists who have ceased their labors and in most cases there are drug stores that have interesting histories. There is much other material that has historical value which can be compiled for presentation. The officers of the Section are, Prof. Lewis Gershenfeld, 43rd & Kingsessing Ave., Philadelphia, and the secretary is Prof. C. O. Lee, who may be addressed at Purdue University, LaFayette, Ind. Original papers should be mailed to Professor Lee but carbon copies may be addressed to the Historian, 10 W. Chase St. The officers of the Section will be glad to make suggestions. Please advise them as early as possible.

SECTION ON COMMERCIAL INTERESTS.

The Section on Commercial Interests has its program well in hand in so far as an outline of the contemplated plan is concerned. The officers hope to make this meeting more interesting and serviceable than ever, and are inviting contributions from the Boards of Pharmacy and the Schools of Pharmacy. Many of the papers will doubtless deal with surveys, however, this should not prevent prospective contributors from preparing papers on subjects that they are interested in. It is by cooperation of a large number that profit accrues to the members.

Prof. Leon Monell, 332 Lisbon Ave., Buffalo, N. Y., is the chairman of the Section and Henry Brown, 432 S. Washington Ave., Scranton, Pa., is the secretary.

The officers request that all prospective contributors correspond with them at an early day so that the program may be completed.

CENTURY OF PROGRESS EXPOSITION.

Information has been given out that practically all of the underground work and landscape preparation at the World's Fair has been completed and the work of painting is progressing rapidly. Recently, about three hundred Chicago druggists lunched at the Adminis-

tration Building and viewed the grounds and buildings. Among the speakers of the occasion was Fred Gordon Miner, a writer and world traveler who gave an account of the financing of the Fair by Chicago business men and institutions. In his opinion the admissions during the Fair would run up to more than fifty million people. He also stated that more than thirty million dollars worth of business had been booked by the hotels of Chicago.

MOUNDS ABOUT MADISON.

Madison was an important center for the ancient mound-building Indians. No city in America has so large and varied a collection of ancient earthworks in its environs. There were originally over a thousand mounds on the shores of the five Madison Lakes, Mendota, Monona, Wingra, Waubesa and Kegonsa. This is a greater number than were located in any other similar region in the state. In the past twenty years many of these have been destroyed in farming operations and in the growth of the city; every Madison citizen and visitor to the city should learn to know about those which remain and many of which are preserved to the public and marked with tablets. Groups of mounds and solitary specimens may be seen in Hudson and Elmside Parks and in Frost's Woods on the shore of Lake Monona, in Vilas Park and at Lake Forest on the shores of Lake Wingra, in Forest Hill Cemetery, and on the University Grounds, Black Hawk Country Club Grounds, at West Point, the State Hospital Grounds and Burrows Park on the shores of Lake Mendota.

In the mound groups about Madison are effigies built to represent the bear, deer, lynx, panther, wild goose, eagle or hawk and the turtle. These effigies probably represent the clan emblems or totems of the Indian clans who in prehistoric time inhabited this beautiful Four-Lake region. They portray the guardian spirits of these ancient tribal clans.

In the State Historical Museum in the Historical Library building maps and diagrams of the Indian mounds and other earthworks of Wisconsin may be seen. In its hundreds of exhibition cases human remains and thousands of clay, stone, shell, copper, bone, antler and other implements, ornaments and ceremonial objects obtained from Wisconsin mounds and from the graves and village sites in their vicinity may be viewed and studied.

AMERICAN CHEMICAL SOCIETY.

The 85th annual meeting of the American Chemical Society was held in Washington, D. C., March 27th, with an attendance of more than 2000. Charles E. Munroe, sole surviving charter member of the Society, was honor guest at a general dinner. Irving Langmuir, *Nobel Laureate* in chemistry, delivered an address. Charles L. Reese is the president-elect of the Society.

Divisional meetings were held in the Willard, Washington and Raleigh hotels, and about five hundred papers were presented before the seventeen divisions.

Among the papers presented before the division of Medicinal Chemistry, were the following:

"The Local Anesthetic Action of *p*-Aminophenyl Urethanes," R. L. Shriner and W. H. Horne; "Some α-Naphthyl Derivatives of Barbituric Acid and Hydantoin," DeWitt T. Keach; "Some Relationships between Constitution and Physiological Action in the Morphine and Phenanthrene Series," L. F. Small, N. B. Eddy and Co-workers; "Determinations of the Potency and Deterioration of Pollen Extracts Used in the Treatment of Hayfever," Arthur Stull and R. A. Cooke; "The Occurrence of *N*-Nonane in the Volatile Oil of *Sarothra gentianoides*," L. S. J. Marion and M. T. Bogert; "A Contribution to the Analysis of Bergamot Oil," D. D. Mossman and M. T. Bogert; "Investigations in the Autoxidation of Aldehydes Used in Perfumery," M. T. Bogert and E. G. McDonough; "The Influence of Storage on the Fatty Acid Content of Cod Liver Oil," A. D. Holmes, Francis Tripp and D. F. Menard; "Some Unsymmetrical Aryl Sulphides," N. E. Foss, Fitzgerald Dunning and G. L. Jenkins; "Acid Base Equilibria in Certain Extractive Preparations of Digitalis," J. C. Krantz, Jr., and J. C. Munch.

AMERICAN DRUG MANUFACTURERS' ASSOCIATION.

An open-round-table clinic at which selected subjects will be discussed by members of the Committee on Sales and Advertising Problems, will be held at the Thursday, May 11th, session of the 22nd annual meeting of the American Drug Manufacturers' Association at Hot Springs, Va. J. K. Lilly, Jr., will discuss "Cost Accounting of Sales" and R. R. D. Keim will offer "The Economics of Price Standardization."

Two sessions of the meeting will be given over to the biological section of the association. Dr. George W. McCoy, director of the National Institute of Health, Washington, D. C., is expected to attend.

PROPRIETARY ASSOCIATION.

The Proprietary Association will hold its 1933 convention on May 24th–26th, at the Biltmore Hotel, New York City. The veterinary section of the association will hold its sessions on the first day. The regular meetings will be held on the remaining two days.

BOARD OF DIRECTORS PHILLIPPINE COLLEGE OF PHARMACY.

The officers and members of the Board of Directors of the Phillippine College of Medicine and of Pharmacy, recently elected, are: *President*, Dr. M. V. Arguellos; *Secretary*, Ldo. Antonio G. Llamas; *Vice-President Pharmacist*, Dr. Rafael Villafranca; *Vice-President Physician*, Dr. Rosendo R. Llamas; *Treasurer* Dr. Patrocinio Valenzuela; *Members*, Dr. Leancio Lopez—Rezal, *Editor and Librarian;* Dr. Alfredo L. Guerrero, Ldo. Primo Arambulo.

UNIVERSITY INSTALLS DRUG GARDEN.

BY SIDNEY NATHANSON.

The George Washington University is augmenting its courses in the field of pharmacology by the use of a medicinal drug garden. It has been through the coöperation of Cloyd Heck Marvin, president of the University, and Mrs. Lillian Wright Smith, landscape gardener, that this garden, which will be in the University yard, has been made possible.

Small germinated plants will be used in the garden instead of planting seeds. This will save about three weeks' time in producing these plants because of the early spring climatical conditions prevailing in Washington which are not adaptable to the plants' growth. These plants have been given to the pharmacology students by the research division on poisonous and medicinal drugs of the Department of Agriculture. This department will also furnish types of sprouts from shrubs and trees as well as bulbs to be used along with the seedlings to fill the garden.

The entire garden will contain approximately eighty well-known drugs and plants which are in constant use for the manufacture of medicinal preparations. During the growth of the plants, these will be studied by the class; the garden taking the place of the laboratory period. Thus, the students will become acquainted with plant life, the characteristics of each plant and a knowledge of the important parts which have botanical and commercial importance.

CALIFORNIA RELIEF FUND.

California Pharmaceutical Association is accepting remittances for the Relief Fund for those who suffered in the recent disaster in Southern California. Contributions are coming in from individuals throughout the state, wholesale druggists and manufacturers everywhere. The latter are also replacing damaged stock. About two hundred druggists suffered losses.

THE U. S. CHAMBER OF COMMERCE.

The 21st annual meeting of the U. S. Chamber of Commerce will be held in Washington, May 2nd to 5th. It is to be hoped that this business organization, in convention, will formulate action on some of the emergencies which have been considered for the relief of present conditions. A worthwhile program has been arranged dealing with important phases of business; some of the subjects will be discussed at Round Table conferences.

OFFICERS OF BOSTON DRUGGISTS' ASSOCIATION.

The following officers were elected at the annual meeting of the Boston Druggists' Association: *President*, Charles A. Loring; *Treasurer*, C. Herbert Packard; *Secretary*, Walter R. Dolliver. The *Executive Committee* is composed of Samuel L. Best, Martin E. Adams, Harry C. Wiggin, C. Fred Wright, Theodore J. Bradley, Wm. A. Glover, Wm. R. Acheson.

KANSAS PHARMACEUTICAL ASSOCIATION.

Governor Alfred M. Landon was on the program for the Wednesday (April 12th) afternoon session of Kansas Pharmaceutical Association. President-elect Robert L. Swain, of the AMERICAN PHARMACEUTICAL ASSOCIATION, delivered

an address at the morning session and extended the greetings of the ASSOCIATION. Officers' reports were made on Tuesday (April 11th) morning; President Mac Childs delivered his address at the afternoon meeting.

Round Table discussions were features of the program and covered various phases of drug store activities. Entertainments included a banquet, dancing and auto trips.

There was a good attendance and the convention was pronounced a success.

ASSOCIATION ITEMS.

The forty-third annual meeting of the **Colorado Pharmacal Association** will be held at Antlers Hotel in Colorado Springs, June 13th to 15th.

The fifth annual meeting of **New Mexico Pharmaceutical Association** meeting will be held at Carlsbad, May 24th to 25th. The attraction of Carlsbad is the Carlsbad Cavern. The entertainment provides for a trip into the caverns where a luncheon will be served, 750 feet under ground.

Secretary J. W. Gayle, of Kentucky Board of Pharmacy and Kentucky Pharmaceutical Association, has been elected member of the "Tall Story Club," an international story club sponsored by Lowell Thomas.

The Maryland Pharmaceutical Association will hold its annual meeting at Ocean City, June 20th to 22nd.

MAINE PHARMACEUTICAL ASSOCIATION.

George O. Tuttle of Portland succeeds the late Dr. M. L. Porter of Danforth as treasurer of the Association. The meeting place is Rangeley Lake House, Rangeley, Maine, and the date of meeting is June 27th to 29th.

OKLAHOMA PHARMACEUTICAL ASSOCIATION.

The Oklahoma Pharmaceutical Association will convene in Muskogee, April 25th to 27th. The meetings will be held in the City Hall. Among the speakers of the occasion will be Herbert Mayes, editor of the *American Druggist.* A feature of the meeting will be the Round Table discussions. Walter D. Adams will be one of the speakers and also Roy C. Reese, secretary of the Kansas Pharmaceutical Association.

TEXAS PHARMACEUTICAL ASSOCIATION.

Texas Pharmaceutical Association will hold its annual session in Galveston, May 15th. Dallas druggists are making strong efforts to carry away the attendance trophy—the Southern Methodist University band will lead the procession.

VIRGINIA PHARMACEUTICAL ASSOCIATION.

Virginia Pharmaceutical Association has made a change in its meeting place. The Association will meet at the Cavalier Hotel, Virginia Beach, June 26th–27th.

VIRGINIA BOARD.

By vote of the Virginia Board of Pharmacy meeting, effective March 1, 1933, H. C. Littlejohn, Leesburg, became *President* of the Board and D. E. Seagle, Pulaski, *Vice-President;* W. L. Lyle, Bedford, whose term expired on March 1st, served as president until that date, and H. C. Littlejohn served as vice-president. The new member of the Board, taking Mr. Lyle's place, is Edward P. Turner, Newport News. Mr. Lyle completed twenty years of service on the Board, the last twelve years as president.

The next meeting of the Board of Pharmacy, at which examinations will be given, will be held in Richmond on June 6 and 7, 1933.

SECTION ON EDUCATION AND LEGISLATION.

In the past the discussions at the meetings of the Section on Education and Legislation have undoubtedly had effects in the shaping of educational policies and legislative activities in American pharmacy. This Section is the point of contact and the scope of its activities is sufficiently broad to include all phases of educational and legislative effort.

The Section is desirous of receiving papers on any subject within its sphere and hopes for as ready a response as in the past. Each year shows an increase in the number of titles and a more lively interest in the discussions which these papers provoke. In many instances the influence of a meeting can be materially increased by concentrating on a few timely topics. The officers of this section believe that the following subjects are especially worthy of dis-

cussion at this time and would be glad to receive your views upon them: 1. The experience requirement as prerequisite to licensing; 2. Methods for the standardization of retail pharmacies; 3. Comments upon the recently issued pharmaceutical syllabus; 4. The regulation of the practice of pharmacy in hospitals.

Titles and short abstracts of papers to be presented at the Madison meeting should be forwarded to the secretary of the section at an early date. All papers will receive attention even though it may be impossible for those submitting them to be present at the meeting.
W. Henry Rivard, *Chairman*.

C. W. Ballard, *Secretary*,
115 West 68th Street,
New York, N. Y.

PURDUE BUSINESS CONFERENCE.

The third annual Druggists' Business Conference of Purdue University was postponed from March to April 25 and 26th. Excellent programs were arranged for morning, afternoon and evening sessions. Approximately two hundred druggists have attended prior meetings. The discussions are largely concerned with legal and legislative matters; business conduct is always an important item and the conferences afford an opportunity for druggists of Indiana to exchange experiences. Luncheons, dinners and a banquet were a part of the entertainment program.

ANNUAL "BLIZZARD" GLASS DINNER.

The class of 1888, New York College of Pharmacy, known as the "Blizzard" class, held their annual dinner March 13th. The following members were in attendance: Charles F. Keale, Fred H. Plump, Charles A. Schine, Judge A. V. B. Voorhees, C. E. Trautmann, Charles W. Bartlett, W. F. Luneberg, George G. King, George C. Diekman. The following members of the class were unavoidably absent: W. T. Huggins, S. V. B. Swann, Reginald Dyer, Leon Wernert, John P. Frawley, Fred C. Viele, J. Graham Reeves, Otto Raubenheimer, Harry S. Miles, Arthur T. Brown.

TYPE PRESCRIPTIONS.

SUGGESTED TO PHYSICIANS BY THE ACADEMY OF PHARMACY, CINCINNATI.

℞	*Metric.*	*Apoth.*
Potass. Guaiacol. Sulphon.	2 Gm.	ʒss
Ammon. Chlor.	2 Gm.	ʒss
Chloroformi	0.5 cc.	♏viii
Syr. Prun. Virg.	60 cc.	fʒii
Elix. Rub. Arom. *q. s. ad*	90 cc.	fʒii

Sig: 4 cc. every 4 hours.

℞		
Ammon. Chlor.	8 Gm.	ʒii
Mist. Glycyrrh Co.	90 cc.	fʒiii

Sig: 4 cc. every 4 hours.

℞		
Codein. Sulph.	0.36 Gm.	gr. *vi*
Acid. Phos. Dil.	6.75 cc.	fʒiss
Syr. Prun. Virg. *ad.*	90 cc.	fʒiii

Sig: 4 cc. every 4 hours.

Sprays and Nose Drops.

℞	*Metric.*	*Apoth.*
Camphoræ	0.16	gr. *iiss*
Mentholis	0.16	gr. *iiss*
Petrolat. Liq. levis	30.00	fʒi

Sig: 5 drops in each nostril three times daily.

℞		
Camphoræ	0.064	gr. *i*
Mentholis	0.064	gr. *i*
Petrolat. Liq. levis	30.00	fʒi

Sig: 5 drops in each nostril three times daily.

℞		
Ol. Pin. Pumil.	0.6	♏ix
Ol. Cinnam.	0.06	♏i
Camphoræ		
Mentholis aa	0.3	gr. *v*
Petrolat. Liq. levis	30.0	fʒi

Sig: 3–5 drops in each nostril three times daily.

℞		
Sol. Ephedrine Sulph., 3%	15.	fʒss

Sig: 3 drops in each nostril three times daily.

LEGAL AND LEGISLATIVE.

MEDICAL BILLS IN CONGRESS.

H. R. 1718, introduced by Representative Celler, New York, and relating to the prescribing of medicinal liquors, has been ordered favorably reported by the sub-committee of the House Committee on the Judiciary. This bill is sponsored by the American Medical Association. H. J. Res. 4, introduced by Representative Blanton, Texas, proposes to direct the President of the United States to use the army, navy and marine corps, the militia of the several states and the resources of the Government in suppressing all smuggling into the United States of intoxicating liquors and narcotics.

FORGED PRESCRIPTION LEGISLATION.

Article 27, Section 65, Maryland Annotated Code, reads: "If any person shall falsely make, alter, forge or counterfeit, or cause or procure to be falsely made, altered, forged or counterfeited, or shall willingly aid or assist in falsely making, altering, forging or counterfeiting, or shall utter or pass, knowing it to be falsely made, altered, forged or counterfeited, any order, paper, letter writing, prescription, recipe or other device purporting to have been made by a regular practising physician, for any drugs, medicines, spirituous or fermented liquors, he shall be deemed guilty of a misdemeanor and on conviction in any court in this state shall be sentenced to the jail, the house of correction or penitentiary, for not less than six months nor more than two years in the discretion of the court. If, upon trial of any person charged with, or indicted for such misdemeanor, it shall appear that he paid for, or offered or promised to pay for, the drugs, medicine, spirituous liquor or fermented liquor obtained by means of such falsely made, altered, forged or counterfeited order, paper, letter writing, prescription, recipe or other device purporting to have been made by a regular practising physician, he shall not by reason thereof be acquitted of such misdemeanor."

TRADE COMMISSION RULES THAT EFFECT OF ARMAND POLICY CONSTITUTES RESTRICTIVE AGREEMENTS.

The Federal Trade Commission has issued a cease and desist order, against the Armand Company, requiring the company to stop its methods of maintaining resale prices. Final argument in the case had been heard nearly eleven months ago.

The announced Armand policy of preventing Armand goods from reaching price-cutters resulted in definite agreements to maintain prices and distribution channels in six specific instances, the commission found, and, as agreements to maintain prices are illegal, the commission ordered the company to cease the practice.

The Armand plan was very carefully worked out in an attempt to stay within the law which permits manufacturers to refuse to sell to price-cutters or others as it chooses, and to make known its policy in this respect, but which forbids agreements to maintain prices or restrain trade. The company apparently made every effort to prevent procedure under its policy from being considered an agreement to abide by the policy, making all transactions wholly voluntary, but the commission cited six instances where it was declared an unwritten agreement resulted.

The order is against "entering into or procuring either directly or indirectly from wholesale or retail dealers contracts, agreements, understandings, promises or assurances" that resale prices will be maintained or that Armand goods will not be sold to price-cutters.

An appeal is planned. The energetic interest of Armand Company offers encouragement.

LEGISLATIVE ITEMS.

The Florida Chain Store Tax was declared unconstitutional by the United States Supreme Court. Judge Brandeis dissented. "In his opinion," the judge stated, "true prosperity comes through the courage, the energy and the resourcefulness of small men." By giving them opportunities for leadership, can confidence in our future be restored and the existing misery be overcome. He knew of nothing in the Federal Constitution which precluded the state from subjecting corporate chains to discriminatory license fees.

A ruling of the Attorney General of Texas declares Section 14 of the State Pharmacy Law unconstitutional, namely, that part of the annual renewal fees of pharmacy certificates which provide that these fees be paid to Texas Pharmaceutical Association, in the manner

named in the law. Fortunately a provision of the law is to the effect that if a part of the law is declared unconstitutional the part not coming under the ruling is in force.

A California bill prohibits secret payments of rebates and discounts; another, requires a complete formula on packages of cosmetics.

A New Hampshire bill amends the Food and Drug Act by adding to the definition of drugs, "any article for cleansing or enhancing the appearance of the person." If this bill becomes a law it might result in only pharmacists being permitted to sell cosmetics.

A California bill makes "one-to-a customer" sales illegal.

Lewis K. Liggett Company filed a voluntary petition in bankruptcy March 31st in the United States District Court for the Southern District of New York.

BUREAU OF INDUSTRIAL ALCOHOL TRANSFER PROTESTED.

Chairman S. L. Hilton of the Council of the AMERICAN PHARMACEUTICAL ASSOCIATION has addressed President Franklin D. Roosevelt, protesting against the transfer of the Bureau of Industrial Alcohol to the Department of Justice. He pointed out that this particular phase of the question is a revenue and not a police measure and properly belongs to the Internal Revenue Bureau of the Treasury Department; that this Department has the trained personnel to efficiently and economically handle the permissive and revenue features by reason of long experience. The request is made that the transfer be given serious consideration and that it be retained as at present organized under the Treasury Department.

UNIQUE PROFESSIONAL PHARMACY OPENED.

The *Northwestern Druggist* describes the Prescription Pharmacy, a unique drug dispensary, which opened for business in Madison, January 5th. Silver-grey birch fixtures of modern design, with black and silver trim, set the color scheme for the front section of the store. Harmonizing lounge furniture, in early American style, provides a comfortable waiting-room. Colorful show globes and gleaming mortars and pestles bring into this modern setting the atmosphere of the old apothecary shop.

The opening window display presented the story of quinine, featured a cinchona map drawn by Laura Kremers, as well as several cinchona specimens and cinchona derivatives, and was installed by E. J. Ireland. It will be followed by similar historical and professional displays. Show-cases in the store hold collections of valuable drug bottles, crude drugs, fine glass apparatus and other professional equipment. The prescription room is finished in ivory; an interesting collection of pharmaceutical literature is available at all times to any one for reference or reading.

Samuel R. Chechik, manager of the pharmacy, is a graduate of the University of Wisconsin and was awarded his Ph.D. degree in 1931 following seven years of study and research. For the past year he has been affiliated with the University staff as assistant chemist of the pharmaceutical experimental station; several contributions from him have appeared in the JOURNAL A. PH. A.

Mr. Chechik says, "We hope to revive the original conception of pharmacy, modern in every detail."

PERIODICITY OF INFLUENZA.

Since 1920, periodicity, or at least approximate periodicity, has been a striking characteristic of influenza epidemics, a fact to which attention is called in a recent issue of the *Metropolitan Statistical Bulletin*. It is cited that 1920 was an exceptionally bad influenza year; and that in 1923, 1926 and 1929 peaks in the influenza death-rate curve were in evidence.

If this three-year cycle had continued with exactitude, another peak in the mortality rate would have been in evidence for the year 1932. Influenza in epidemic form did not, however, make its appearance in 1932 until early November; and there is no indication that a sufficient number of fatal cases were recorded to account for another peak death rate, especially in view of the very low influenza rate which prevailed during the first ten months of the year. It is entirely possible, nevertheless, that a peak will be registered for 1933, especially if influenza mortality continues to increase at the rate observed during the closing weeks of 1932.

Up to the present time there are no indications that the influenza cases now prevailing are of the virulent type which characterized the major outbreaks of 1918 and 1920.

BOOK NOTICES AND REVIEWS.

Lehrbuch der Physiopharmakognosie für Pharmazeuten. By RICHARD WASICKY, Professor of Pharmacognosy, University of Vienna. Part II, pages 335–915, 123 figs. and 1 col. illust. Paper bound. Carl Fromme, Vienna and Leipsig, 1932.

The second part of Dr. Wasicky's work presents a continuation of his discussion of drugs classified according to their physiological action and medicinal uses. In this volume, after a brief introduction, medicinal materials are considered under the following captions: Anthelmintics, cholagogues and choleretics, remedies for diseases of the respiratory tract, cardiacs, vascular remedies, diuretics, antidiuretics, diaphoretics, anhydrotics, aphrodisiacs and anaphrodisiacs, blood and bone remedies, remedies for diseases due to faulty metabolism, styptics, specific remedies for infectious diseases, remedies for bladder diseases, for the treatment of eye maladies, for nose and ear troubles, for obstetrical and gynecological use, galactagogues, cutaneous remedies, remedies for the treatment of genital diseases, adjuvant remedies of prescriptions and other remedies, addenda and corrections.

Under many of these captions the author places subcaptions of drugs based upon similarity of their action or constituents, etc. For example, the caption of "Anthelmintics" is subdivided into *A*, Drugs of the *Filix* group, *B*, Anthelmintics with effective alkaloids, *C*, Cina and the group of drugs with anthelmintic effective ethereal oils, and *D*, "Drugs with unexplained anthelmintic action."

Both the greater and the lesser groups are discussed as to general peculiarities of the drugs included. There follows a separate discussion for each drug belonging to the group. Each important drug is first defined. After usually brief statements upon synonym, habitat, plant or animal, the culture and commercial varieties, the gross anatomical and histological features are considered. This is followed by a detailed consideration of the chemical properties of their constituents, the most active of which are described with the aid of graphic formulas. The adulterants and substitutes receive due attention. In some instances short historical notes upon the introduction of the drug and the isolation of its chief active constituents or other interesting information concludes the monograph.

The system of classification used by the author differs from that usually found in Pharmacognosy texts, the concepts employed for many of its captions and subcaptions being quite original.

The histological features of many of the drugs are largely limited to outstanding structures while others are considered in more detail. No special consideration is given to the microscopy of the powdered article.

In the field of drug chemistry the work deserves particular commendation for it is in this least elaborated phase of most pharmacognosy texts that the author applies his greatest emphasis and exhibits a profound acquaintance with the subject.

The pages that he devotes to the saponins (pages 382–392) are rich with up-to-date information upon the subject in which he is an authority of the first magnitude.

The type is clear and many of the illustrations are well selected. It was somewhat surprising to note the unusual practice of placing the author citations of scientific names of plants and animals in italics, since this is not the accepted method of biologists.

The volume as a whole is of excellent merit and can be recommended as a reference to professional pharmacists, pharmaceutical chemists and workers in the field of pharmacognosy and plant chemistry.—H. W. YOUNGKEN.

The *Apotheker Kalender* for 1933. Issued by the German Apothecaries' Society. This annual publication is always welcome. The issue for 1933 is the 8th, and depicts a number of interesting historical events; it is printed on heavier paper than heretofore. For those who desire to use the illustrations as separate cards it is an improvement; for those who have been accustomed to preserve the *Kalender*, as in the past, the thinner paper may be preferred; this, however, does not detract from the artistic production of Dr. Fritz Ferchl who gives much time to this excellent work and places all pharmacists in debt to him for this service. On the cover is the reproduction of a portrait of Hulderich Wolfhardt, an apothecary of the 18th century. Other illustrations are engravings or wood cuts of notable personages in German pharmacy, exteriors and interiors of historic pharmacies and varied subjects of pharmaceutical interest. There are a number of interesting reproductions of manuscripts; for example, a letter of Karl Friedrich Mohr, apothecary, who contributed largely to the

analytical chemical method of titration and is also known in connection with the balance by his name. One of the pages carries a reproduction of "Schroeders Medico-Chemical Pharmacopœia;" another, that of an oil painting of a pharmacy of the 17th century. A letter from Baron von Liebig to Heinrich Emanual Merck is timely; it was a son of the latter who discovered the papaverine in Liebig's Laboratory. These references could be continued throughout the pages of the Kalender of about forty pages, all of which are most interesting. In ordering our copy of the Kalender a number of extra copies were included for the convenience of our readers. It is, of course, understood that no advanced price is asked; including postage, this is 75 cents. Requests should be addressed to the AMERICAN PHARMACEUTICAL ASSOCIATION, 10 West Chase St., Baltimore.

The Canadian Formulary, with which is bound *The Reference Companion*. Prepared by The Committee on Pharmaceutical Standards. A copy of the Formulary has been received too late for comment, which will be made in the next issue of the JOURNAL. We are indebted to the *Canadian Pharmaceutical Journal*.

Formulaire des Medicaments Nouveaux for 1933, 36th Edition, compiled by Dr. R. WEITZ, member of the Faculty of Pharmacy, Paris, and pharmacist at the Paris dispensary. The preface has been written by PROF. PAUL CARNOT of the Faculty of Medicine, Paris. Published by J. B. Bailière and Sons, 19 rue Hautefeuille, Paris, France. Price 36 francs, in paper binding.

The Formulary is the successor of the Formularies Bocquillon Limousin. Prior editions of this Formulary have been reviewed in the JOURNAL. In the preparation of this book the officials of the French Codex have not been included. The preparations are described in monographs and more attention has been given to the therapeutics than in other publications of this kind. While of first importance to the French pharmacist, the Formulary is of value in all pharmacies where foreign prescriptions are filled. Both official and trade names are given of chemicals, description and their dosage. An index of sixty pages speaks for the number of items which have received consideration in this Formulary. The concluding pages of the book contain an alphabetical list of pharmaceutical specialties, together with the names of the manufacturers.

History of the German Apothecaries' Society 1820–1932, edited by BERTOLD KRISCHKE. Pages VII + 315. Published by the German Apothecaries' Society at Berlin. This interesting volume of history of the German Apothecaries' Society has been published in commemoration of the sixtieth anniversary of the amalgamation of the northern and southern German societies. The text has been prepared from official records by the editor who has taken an active part in affairs of the Association for more than forty-five years. He has succeeded in giving in a condensed form a very complete report of German pharmaceutical matters, beginning with 1820. Conditions in general, and particularly of the drug business, are interestingly reported. The volume is well bound and printed and evidences not only a careful student but an acquaintance with the events that makes of this publication a valuable historical record.

The Egyptian government has issued its annual report, for the year 1932, of the Central Narcotics Intelligence Bureau. It covers 170 pages and deals with all phases of the production of narcotics and narcotic traffic; the means applied in smuggling and a general account of the progress made in restricting narcotic addiction.

A memorial number of the Apothecaries' Society of Nuernberg, commemorating the 300th anniversary of the pharmaceutical college, has been prepared by pharmacist L. BRUNNER, and issued by the Society of Nuernberg and the Society for the History of Pharmacy, and illustrated by pharmacist Dr. Ferchl. It is an interesting historical volume full of information of the period covered by the publication.

DISCUSSION OF FOOD AND DRUG ACT REVISION.

Representatives of the Food and Drug Trade as well as officers of several associations of publishers, broadcasters and advertisers have been invited to meet with the Assistant Secretary of Agriculture, R. G. Tugwell, April 27th to 29th to offer suggestions regarding a revision of the Food and Drugs Act.